LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT IN CONNECTICUT - 1996

Prepared By

Connecticut Hazardous Waste Management Service
Low-Level Radioactive Waste Program
50 Columbus Boulevard, 4th Floor
Hartford, Connecticut 06106

Pursuant To

Connecticut General Statutes
Section 22a-163b

December 1997

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Connecticut Hazardous Waste Management Service

The Connecticut Hazardous Waste Management Service is a non-regulatory, quasi-public agency with statutory responsibility to promote the appropriate management of hazardous waste and low-level radioactive waste generated in Connecticut. Activities are directed by a Board of Directors consisting of a voting chairperson who is appointed by the Governor; six additional voting members, who are appointed by the Governor, with representation from Connecticut's six Congressional districts and from the general public, the scientific community, and the business community; and four non-voting members who are statutorily-specified state agency heads or their designees.

Manuscript Prepared By

Steven L. Levine, Esq., Technical Specialist

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SUMMARY OF CHANGES TO THE OCTOBER, 1997 DRAFT

The October, 1997 draft of "Low-Level Radioactive Waste Management in Connecticut - 1996" was released for public review and comment pursuant to CGS Section 1-121 following publication of a notice of intent to adopt procedures in the Connecticut Law Journal on October 14, 1997. The closing date for receipt of public comments was November 14, 1997.

The Connecticut Hazardous Waste Management Service held a public meeting on the draft report at its offices in Hartford on November 12, 1997.

No written or documented verbal comments were received.

The following list identifies significant changes made to the draft report as a result of internal review of the document. The revisions are listed by page number and in the order which they appear in the final report.

Page	Revision
1+	Portions of the report and Appendix A were rewritten and reorganized to improve their accuracy, clarity, and content. Changes included revision or addition of text concerning: Volume reduction trends and statistics due to off-site processing of LLRW; and the projected restart schedule for the Millstone 3 nuclear power plant.
7+	The volume of waste disposed by Wesleyan University has been corrected from 5.0 cubic feet to 5.3 cubic feet in text, tables, and figures. The total volume of waste disposed by all Connecticut LLRW generators in 1996 has been corrected from 11,769.6 cubic feet to 11,769.9 cubic feet. Other figures dependent on Wesleyan University's disposal volume have been revised accordingly as well.
9+	On Tables 2A, 2B, AP-3A, and AP-3B, the volume disposed by ABB Combustion Engineering Nuclear Products has been corrected from 9.0 cubic feet to 900.0 cubic feet. The volume totals presented on these tables were not affected by this error.
A-8	Storage figures for 1993 were corrected to reflect Northeast Utilities' reclassification of 60 cubic feet of waste as Greater-than-Class-C LLRW and to correct omissions discovered as a consequence of recalculating the 1993 storage numbers. Storage figures for 1994 and 1995 were confirmed to be correct.

LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT IN CONNECTICUT - 1996

The Connecticut Hazardous Waste Management Service (CHWMS) is required by Connecticut's low-level radioactive waste (LLRW) disposal facility development law (Connecticut General Statutes (CGS) 22a-163 et seq.) to undertake the following responsibilities:

- Prepare and revise, as necessary, a LLRW Management Plan for the state;
- Select a site for a LLRW disposal facility;
- Select a disposal technology to be used at the site;
- Select a firm to obtain the necessary approvals for the facility and to develop and operate it; and
- Serve as the custodial agency for the facility.

Connecticut is developing a LLRW disposal facility because of requirements imposed by federal law. In 1980 and again in 1985, federal legislation was enacted that makes each state responsible for providing disposal capacity, either individually or in cooperation with other states as a member of an interstate compact, for many types of LLRW generated in the state. Connecticut is a member of the Northeast Interstate LLRW Compact, along with New Jersey. Both states are in the process of siting in-state LLRW disposal facilities, as well as cooperatively seeking an out-of-state and out-of-region option for providing LLRW disposal capacity under the auspices of the Northeast Compact.

In undertaking its responsibilities, the CHWMS's primary goal, as established in state statute, is protection of public health and safety and the environment.

Since 1988, the CHWMS has reported annually on the generation and management of LLRW in Connecticut. This report presents information on the generation and management of LLRW in Connecticut during 1996. The data presented here for 1996 were compiled from annual reports submitted by LLRW generators to the Connecticut Department of Environmental Protection (DEP) during the spring of 1997. A more detailed analysis of the data is presented as Appendix A, and a copy of the form used for generator reports is provided in Appendix B.

1. The Connecticut Hazardous Waste Management Service

The CHWMS is a nonregulatory, quasi-public agency established by the Connecticut General Assembly in 1983. When the General Assembly originally established the

CHWMS, it gave the CHWMS responsibility for planning for and promoting the appropriate management of hazardous waste (i.e., waste covered under the federal Resource Conservation and Recovery Act) generated in Connecticut. The CHWMS's LLRW responsibilities were established by the General Assembly in the 1987 LLRW disposal facility development law.

The CHWMS is directed by an 11-member Board of Directors, seven of whom are currently voting members.

- The Chairperson of the Board is appointed by the Governor, with the consent of both houses of the General Assembly. The Chairperson is selected at-large from Connecticut's citizens without geographic or economic sector constraints and serves at the pleasure of the Governor. The Chairperson also serves as the Executive Officer of the CHWMS.

- The other six voting directors are appointed by the Governor for staggered four-year terms. One director must be appointed from each of Connecticut's six Congressional districts. Two of these directors must represent the public, two the business community and two the scientific community.

- The four non-voting directors, representing various state agencies, will become voting members after a preferred site is selected for a LLRW disposal facility. The members of the Board of Directors are listed in Appendix C.

2. Low-Level Radioactive Waste

LLRW is defined[a] in federal law (P. L. 99-240, Sec. 2(9)) and state law (CGS 22a-163a(9)) in two ways: first, by stating what it is not and, second, by stating what it is. LLRW **is not** spent fuel assemblies from commercial nuclear reactors, high-level radioactive waste (which is the residue from reprocessing spent fuel), or uranium mining and milling wastes. LLRW **is** waste containing radioactive material that the U.S. Nuclear Regulatory Commission (NRC), consistent with existing law, classifies as LLRW. The NRC defines LLRW as having the same meaning as in federal law.

LLRW includes a wide variety of materials that have a wide range of levels of radioactivity. It includes slightly radioactive items, such as protective clothing, paper towels and laboratory equipment, as well as some very radioactive items, such as materials used to purify reactor coolant in nuclear power plants and used equipment from inside nuclear reactors. LLRW is generated in the operation and maintenance of nuclear power plants, as well as by many public and private institutions (hospitals and universities), private research firms, industrial facilities, and the military.

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[a]For additional definitions, please refer to the Glossary at Appendix D.

As previously noted, federal law makes each state responsible for providing disposal capacity for LLRW generated in the state. However, federal law does not make states responsible for *all* LLRW generated within their borders. The federal government, specifically, the U.S. Department of Energy, is responsible for LLRW from the following sources and the following types:

- LLRW owned or generated by the U.S. Department of Energy;
- LLRW owned or generated by the U.S. Navy as a result of decommissioning Navy vessels;
- LLRW owned or generated by the Federal government as a result of any research, development, testing or production of nuclear weapons; and
- Any other LLRW with concentrations of radionuclides that exceed the limits established by the NRC for waste that can be disposed of in a surface or near-surface disposal facility (i.e., "greater than Class C" LLRW).

The NRC's classification system for LLRW is designed to take into account the potential hazards of LLRW in a disposal facility. The system is based on the concentration of particular radionuclides in the waste and is part of an overall regulatory system designed to control the potential human exposure to disposed waste. The classes of LLRW are:

- Class A waste, which generally consists of short-lived radionuclides (radioactive half-lives of less than 30 years), but also includes low concentrations of some long-lived radionuclides. Disposal of Class A waste must isolate the waste for at least 100 years.
- Class B waste, which includes waste with higher concentrations of short-lived radionuclides than Class A waste and concentrations of long-lived radionuclides similar to Class A waste. Class B waste must be in a structurally stable physical form for disposal or in a structurally stable container that will last for a minimum of 300 years.
- Class C waste, which includes waste with the highest concentrations of short-lived and long-lived radionuclides that states are responsible for managing. Disposal units for Class C LLRW must have barriers capable of preventing people in the future from accidentally encountering the waste for at least 500 years.

As federal law specifies, the Department of Energy, rather than the states, is responsible for the management of LLRW that exceeds the concentrations for Class C waste. This LLRW is generally referred to as "greater than Class C" waste. The primary source of "greater than Class C" waste will be the decommissioning of nuclear power plants.

An additional form of waste which the states are currently responsible for managing is "mixed waste." Mixed waste satisfies the definitions of both LLRW and hazardous waste in federal law. Therefore, mixed waste is LLRW which is also chemically hazardous.

3. LLRW Generation and Management in 1996

3.1 Inventory of Generators

Based on analysis of the 1996 generator reports, CHWMS staff has identified 69 active and potential generators of LLRW in Connecticut. These generators are located in 36 towns throughout the state. Figure 1 shows the location of each generator. Table 1 lists and identifies the 69 generators by town and generator category, i.e., fuel fabrication, industrial, institutional, military, nuclear power plant, or private research.

Table 1 also gives the radioactivity and volume of LLRW that each generator 1) was storing on-site at the end of 1996, 2) shipped off-site for management, including disposal, during 1996, and 3) actually disposed during the year. Of the 69 generators listed, 40 generators shipped LLRW off-site for management or to disposal in 1996 and comprise the active subset of generators. The remaining 29 generators are listed with zero entries for LLRW shipped and disposed because they stored LLRW on-site for future disposal (23 potential generators), or projected future generation of LLRW requiring off-site management, but did not ship or dispose LLRW in 1996 (six potential generators).

3.2 Radioactivity and Volume of LLRW Stored On-Site in 1996

Large-scale temporary on-site waste storage by generators continued to be a significant feature of Connecticut's LLRW management during 1996 despite the availability of out-of-state disposal capacity.

Prior to 1994, Connecticut's LLRW generators were able to dispose most of their LLRW (primarily at the Barnwell, South Carolina LLRW disposal facility) within a reasonable time after it was generated and maintained only a small inventory of waste on-site from one year to another.

However, between July, 1994 and June, 1995, as a consequence of national developments in the availability of LLRW disposal capacity, Connecticut generators, as well as generators in many other states, lost access to all full-service LLRW disposal facilities. On July 1, 1994, they began storing waste on-site indefinitely. By the end of 1994, 40 LLRW generators in 23 Connecticut towns had accumulated and were storing substantial quantities of LLRW.

Owing to political and fiscal developments within South Carolina and the Southeast Compact, the Governor and General Assembly of South Carolina enacted legislation which withdrew South Carolina from the Southeast Compact and re-opened the Barnwell facility to LLRW from outside the Southeast Compact region effective July 1, 1995. The

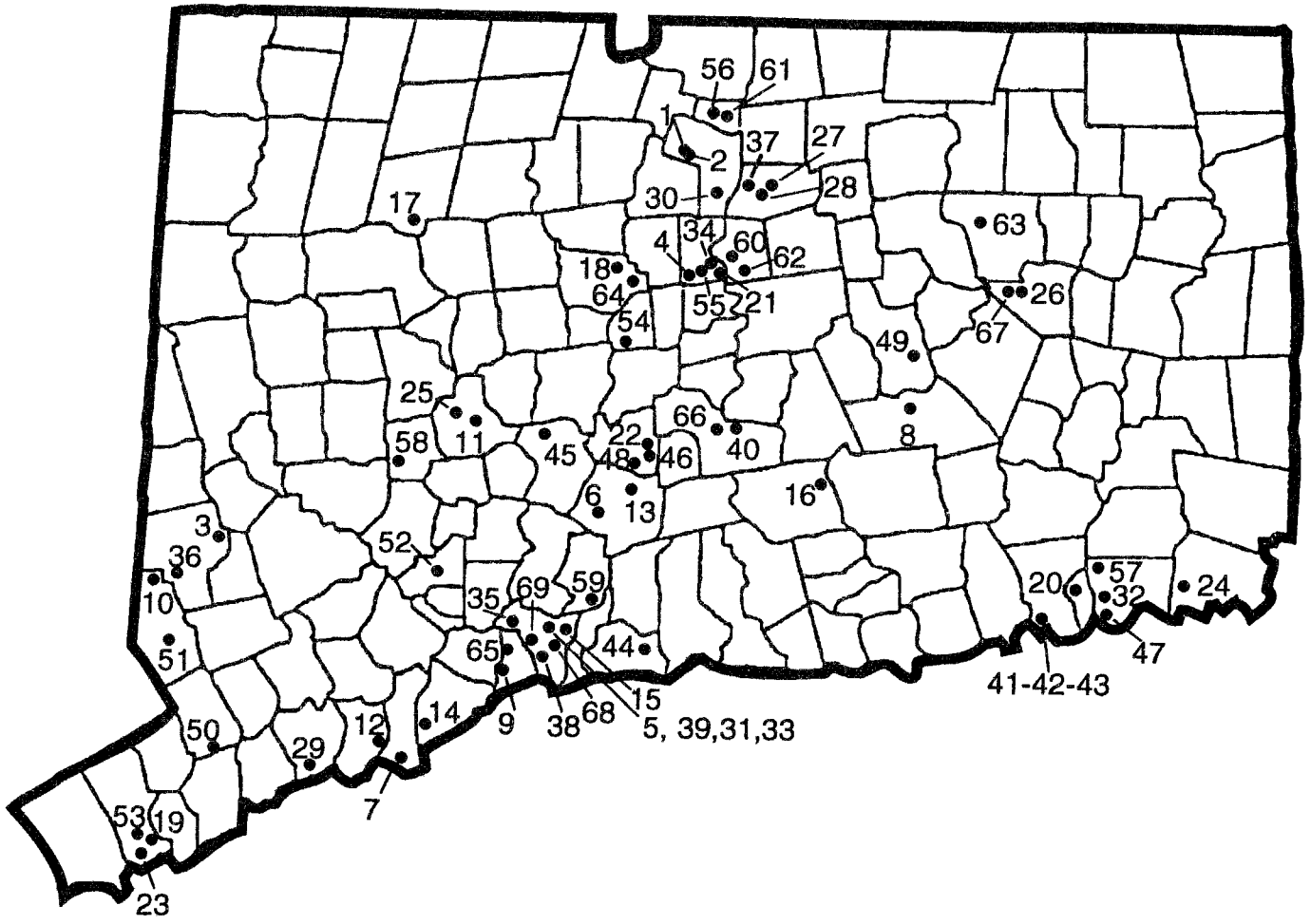


FIGURE 1: LOCATIONS OF CONNECTICUT LLRW GENERATORS

(Identifying numbers are keyed to Table 1.)

TABLE 1: CONNECTICUT GENERATORS THAT STORED, SHIPPED, OR DISPOSED LLRW IN 1996, OR THAT PLAN TO SHIP LLRW FOR MANAGEMENT - BY TOWN AND CATEGORY OF GENERATOR

GENERATOR	TOWN	CATEGORY OF GENERATOR *	LLRW HELD IN ON-SITE STORAGE		LLRW SHIPPED OFF-SITE FOR MANAGEMENT		LLRW SHIPPED TO DISPOSAL FACILITIES	
			VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)
1. ABB Combustion Engineering Nuclear Products	Windsor	Fuel Fabrication	1,578.5	0.032	903.8	0.037	900.0	0.037
2. ABB Combustion Engineering Nuclear Services	Windsor	Industrial	1,150.0	0.100	7,797.5	0.757	12.0	0.196
3. Advanced Technology Materials, Inc.	Danbury	Industrial	0.0	0.000	0.4	<0.001	0.2	<0.001
4. Aerospace Metals, Inc.	Hartford	Industrial	17.0	0.005	0.0	0.000	0.0	0.000
5. Alexion Pharmaceuticals	New Haven	Private Research	43.6	0.042	0.0	0.000	0.0	0.000
6. Allegheny Ludlum Steel Corp.	Wallingford	Industrial	0.0	0.000	0.4	<0.001	0.4	<0.001
7. AlliedSignal Engines (Textron Lycoming)	Stratford	Industrial	0.0	0.000	207.0	0.005	5.6	<0.001
8. Alpha Q, Inc.	Colchester	Industrial	0.0	0.000	0.0	0.000	0.0	0.000
9. Bayer Corporation (Miles Inc.)	West Haven	Private Research	7.5	<0.001	811.7	0.248	167.8	0.255
10. Boehringer Ingelheim Pharmaceuticals	Ridgefield	Private Research	57.0	0.052	42.3	0.518	63.9	1.036
11. Brass Center, Ltd.	Waterbury	Industrial	0.0	0.000	0.2	<0.001	0.2	<0.001
12. Bridgeport Hospital	Bridgeport	Institutional	0.0	0.000	7.5	0.023	1.2	0.023
13. Bristol-Myers Squibb	Wallingford	Private Research	0.0	0.000	294.0	0.482	1.4	0.177
14. Butkin Precision Manufacturing Corp.	Milford	Industrial	320.0	0.001	0.0	0.000	0.0	0.000
15. CT Agricultural Experiment Station	New Haven	Institutional	12.6	0.001	0.0	0.000	0.0	0.000
16. CT Yankee Atomic Power Co.	Haddam	Nuclear Power Plant	2,193.8	1.000	14,823.6	1,252.541	1,557.1	1,196.031
17. Charlotte Hungerford Hospital	Torrington	Institutional	0.0	0.000	0.7	0.001	0.0	0.000
18. Ciba-Geigy (ICI Americas)	Farmington	Private Research	0.0	0.000	134.8	0.001	9.2	0.001
19. Clairol	Stamford	Private Research	0.0	0.000	0.0	0.000	0.0	0.000
20. Connecticut College	New London	Institutional	1.0	0.001	0.0	0.000	0.0	0.000
21. Connecticut Resources Recovery Authority	Hartford	Institutional	0.0	0.000	4.7	<0.001	4.1	<0.001
22. Cuno Inc.	Meriden	Private Research	7.5	0.001	7.5	0.001	0.0	0.000
23. Cytec Industries Inc.	Stamford	Private Research	0.0	0.000	<0.1	<0.001	<0.1	<0.001
24. DeKalb Genetics Corp.	Stonington	Private Research	10.7	<0.001	0.0	0.000	0.0	0.000
25. Diagnostic Radiology Associates	Waterbury	Institutional	0.0	0.000	0.0	0.000	0.0	0.000
26. Eastern CT State University	Windham	Institutional	5.6	<0.001	1.4	<0.001	1.4	<0.001
27. Electro-Methods Overhaul & Repair	South Windsor	Industrial	36.8	<0.001	0.0	0.000	0.0	0.000
28. Electro-Methods, Inc.	South Windsor	Industrial	9.7	<0.001	0.0	0.000	0.0	0.000
29. Fairfield University	Fairfield	Institutional	6.5	0.001	0.0	0.000	0.0	0.000
30. Fischer Technology Inc.	Windsor	Industrial	<0.1	0.068	0.0	0.000	0.0	0.000
31. Genaissance Pharmaceuticals, Inc.	New Haven	Private Research	0.2	0.005	0.0	0.000	0.0	0.000
32. General Dynamics, Electric Boat Div.	Groton	Military	0.0	0.000	0.0	0.000	0.0	0.000
33. Hamilton Chemical	New Haven	Industrial	0.0	0.000	0.4	<0.001	0.4	<0.001
34. Hartford Hospital	Hartford	Institutional	7.0	0.001	0.0	0.000	0.0	0.000
35. Hopkins School	New Haven	Institutional	0.0	0.000	0.1	<0.001	0.1	<0.001
36. Hughes Danbury Optical Systems	Danbury	Industrial	10.0	<0.001	43.8	<0.001	18.3	<0.001
37. International Fuel Cells, Inc.	South Windsor	Industrial	0.0	0.000	0.0	0.000	0.0	0.000
38. John B. Pierce Laboratory	New Haven	Private Research	20.3	0.001	0.0	0.000	0.0	0.000
39. Kodak S.I.S. (International Biotechnologies)	New Haven	Industrial	7.5	<0.001	0.0	0.000	0.0	0.000
40. Middlesex Hospital	Middletown	Institutional	22.0	0.010	0.0	0.000	0.0	0.000

TABLE 1 (continued)

GENERATOR	TOWN	CATEGORY OF GENERATOR *	LLRW HELD IN ON-SITE STORAGE		LLRW SHIPPED OFF-SITE FOR MANAGEMENT		LLRW SHIPPED TO DISPOSAL FACILITIES	
			VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)
41. Millstone 1 Northeast Nuclear Power Co.	Waterford	Nuclear Power Plant	637.6	52,800.000 **	21,178.9	1,080.916	4,264.8	1,096.556
42. Millstone 2 Northeast Nuclear Power Co.	Waterford	Nuclear Power Plant	133.0	33.900	7,028.0	75.987	1,366.2	73.172
43. Millstone 3 Northeast Nuclear Power Co.	Waterford	Nuclear Power Plant	190.8	75.200	4,164.2	499.312	2,101.9	525.599
44. Neurogen Corporation	Branford	Private Research	46.0	0.009	133.0	0.013	23.0	0.010
45. Olin Research	Cheshire	Private Research	2.6	<0.001	0.0	0.000	0.0	0.000
46. Packard BioScience Company (Canberra Industries)	Meriden	Industrial	0.0	0.000	0.0	0.000	0.0	0.000
47. Pfizer Inc.	Groton	Private Research	206.3	0.086	1,768.2	2.057	34.0	1.453
48. Protein Sciences Corporation (MicroGene System Inc.)	Meriden	Industrial	4.1	0.020	0.0	0.000	0.0	0.000
49. RSA Laboratories, Inc.	Hebron	Industrial	1.0	<0.001	0.0	0.000	0.0	0.000
50. S.V.G. Lithography Systems	Wilton	Industrial	1.2	<0.001	0.0	0.000	0.0	0.000
51. Schlumberger-Doll Research	Ridgefield	Private Research	0.5	<0.001	0.0	0.000	0.0	0.000
52. Seymour High School	Seymour	Institutional	0.0	0.000	1.1	<0.001	0.0	0.000
53. Stamford Public Schools	Stamford	Institutional	0.0	0.000	0.2	<0.001	0.2	<0.001
54. Stanley Works (Laboratory)	New Britain	Industrial	0.0	0.000	0.4	<0.001	0.4	<0.001
55. Trinity College	Hartford	Institutional	13.0	0.001	0.0	0.000	0.0	0.000
56. U.S. Army Connecticut National Guard	Windsor Locks	Military	0.0	0.000	13.1	191.014	13.1	191.014
57. U.S. Navy	Groton	Military	142.0	<0.001	997.5	2.002	997.5	2.002
58. Uniroyal Chemical Co.	Middlebury	Private Research	69.6	0.033	74.5	0.018	4.1	0.003
59. United States Surgical Corporation	North Haven	Industrial	4.0	<0.001	15.0	0.014	1.4	0.014
60. United Technologies Research Center	East Hartford	Industrial	6.1	0.003	7.4	<0.001	0.0	0.000
61. United Technologies, Hamilton Standard Div.	Windsor Locks	Industrial	3.5	0.075	0.0	0.000	0.0	0.000
62. United Technologies, Pratt & Whitney Div.	East Hartford	Industrial	300.0	0.020	0.0	0.000	0.0	0.000
63. Univ. of CT Environ. Health & Safety	Mansfield	Institutional	0.0	0.000	79.0	0.123	35.2	0.049
64. University of CT Health Center	Farmington	Institutional	245.0	0.222	150.0	0.050	92.5	0.110
65. VA Connecticut Healthcare System (V.A. Med. Ctr. Hosp.)	West Haven	Institutional	0.0	0.000	15.0	<0.001	0.0	0.000
66. Wesleyan University	Middletown	Institutional	0.0	0.000	15.0	0.001	5.3	0.001
67. Windham Community Memorial Hospital	Windham	Institutional	0.0	0.000	3.0	0.001	0.0	0.000
68. Yale University	New Haven	Institutional	213.9	0.600	1,075.9	0.402	46.1	0.181
69. Yale-New Haven Hospital	New Haven	Institutional	0.0	0.000	0.0	0.000	40.9	0.005
			7,745.0	52,911.490	61,801.2	3,106.525	11,769.9	3,087.925

* Note: Generator categories are abbreviated as follows on subsequent tables and figures
ID- Industrial PR- Private Research IT- Institutional NPP- Nuclear Power Plant M- Military FF- Fuel Fabrication

** 36,000 Curies of this radioactivity were contained in 330 cubic feet of Class C control rod blades.

State of South Carolina has imposed additional surcharges for the right to dispose LLRW at Barnwell and hopes to collect substantial revenue for public education in South Carolina.

Although many Connecticut generators have resumed LLRW shipments to the Barnwell facility, others continued to store waste on-site (see Table 1). Reasons cited for this practice are the high costs of disposing LLRW at the Barnwell facility; and lower rates of generating LLRW, which results in a longer time to collect enough LLRW to justify an off-site shipment.

Thus, at the end of 1996, 42 generators in 26 Connecticut towns were storing 52,911.490 Curies of radioactivity in 7,745.0 cubic feet of LLRW. The 42 generators consisted of 23 which only stored LLRW and 19 that stored waste in addition to shipping and/or disposing LLRW.

3.3 Radioactivity and Volume of LLRW Disposed

As indicated by Table 1, 39 generators shipped a total of 3,106.525 Curies of radioactivity in 61,801.2 cubic feet of LLRW off-site for management, including disposal, during 1996. (An additional generator disposed waste that had been shipped off-site during 1995. This brings the total number of generators which shipped and/or disposed LLRW in 1996 to 40.)

Following off-site processing of most of the waste shipped for management, with the primary intent of reducing volume to be disposed, a total of 3,087.925 Curies in 11,769.9 cubic feet was shipped to disposal facilities. Of this total, nuclear power plants disposed 2,891.358 Curies in 9,290.0 cubic feet of LLRW.

34 of the 40 active generators actually disposed LLRW during 1996. Tables 2A and 2B rank these 34 generators by radioactivity and volume of waste disposed, respectively. Waste shipped off-site by the remaining six active generators was either incinerated during the year (without leaving a residue requiring disposal as LLRW) or held by brokers and processors at the end of 1996.

Figure 2 illustrates the paths that LLRW traveled from generator facilities to disposal sites during 1996. Numbers on Figure 2 indicate the volume of LLRW in cubic feet at each step.

Figure 3 illustrates the percentage of radioactivity and volume that was disposed by each category of generator during 1996. Figure 4 shows the proportions of Class A, B and C waste disposed by Connecticut generators during 1996.

Figure 5 and Figure 6 compare 1996 LLRW disposal volume and radioactivity with disposal data from previous years. The 11,769.9 cubic feet of LLRW disposed by Connecticut generators in 1996 is the second lowest figure on record since 1979. Even if the approximately 7,745.0 cubic feet of LLRW held by generators at the end of 1996

TABLE 2A: CONNECTICUT LLRW SHIPPED TO DISPOSAL FACILITIES IN 1996 - BY GENERATOR

RANKED BY RADIOACTIVITY

GENERATOR	VOLUME (cu ft)	RADIOACTIVITY (Curies)
CT Yankee Atomic Power Co.	1,557.1	1,196.031
Millstone 1 Northeast Nuclear Power Co.	4,264.8	1,096.556
Millstone 3 Northeast Nuclear Power Co.	2,101.9	525.599
U.S. Army Connecticut National Guard	13.1	191.014
Millstone 2 Northeast Nuclear Power Co.	1,366.2	73.172
U.S. Navy	997.5	2.002
Pfizer Inc.	34.0	1.453
Boehringer Ingelheim Pharmaceuticals	63.9	1.036
Bayer Corporation (Miles Inc.)	167.8	0.255
ABB Combustion Engineering Nuclear Services	12.0	0.196
Yale University	46.1	0.181
Bristol-Myers Squibb	1.4	0.177
University of CT Health Center	92.5	0.110
Univ. of CT Environ. Health & Safety	35.2	0.049
ABB Combustion Engineering Nuclear Products	900.0	0.037
Bridgeport Hospital	1.2	0.023
United States Surgical Corporation	1.4	0.014
Neurogen Corporation	23.0	0.010
Yale-New Haven Hospital	40.9	0.005
Uniroyal Chemical Co.	4.1	0.003
Ciba-Geigy (ICI Americas)	9.2	0.001
Wesleyan University	5.3	0.001
Hughes Danbury Optical Systems	18.3	<0.001
AlliedSignal Engines (Textron Lycoming)	5.6	<0.001
Connecticut Resources Recovery Authority	4.1	<0.001
Eastern CT State University	1.4	<0.001
Allegheny Ludlum Steel Corp.	0.4	<0.001
Hamilton Chemical	0.4	<0.001
Stanley Works (Laboratory)	0.4	<0.001
Advanced Technology Materials, Inc.	0.2	<0.001
Brass Center, Ltd.	0.2	<0.001
Stamford Public Schools	0.2	<0.001
Hopkins School	0.1	<0.001
Cytec Industries Inc.	<0.1	<0.001
TOTALS	**11,769.9**	**3,087.925**

TABLE 2B: CONNECTICUT LLRW SHIPPED TO DISPOSAL FACILITIES IN 1996- BY GENERATOR

RANKED BY VOLUME

GENERATOR	VOLUME (cu ft)	RADIOACTIVITY (Curies)
Millstone 1 Northeast Nuclear Power Co.	4,264.8	1,096.556
Millstone 3 Northeast Nuclear Power Co.	2,101.9	525.599
CT Yankee Atomic Power Co.	1,557.1	1,196.031
Millstone 2 Northeast Nuclear Power Co.	1,366.2	73.172
U.S. Navy	997.5	2.002
ABB Combustion Engineering Nuclear Products	900.0	0.037
Bayer Corporation (Miles Inc.)	167.8	0.255
University of CT Health Center	92.5	0.110
Boehringer Ingelheim Pharmaceuticals	63.9	1.036
Yale University	46.1	0.181
Yale-New Haven Hospital	40.9	0.005
Univ. of CT Environ. Health & Safety	35.2	0.049
Pfizer Inc.	34.0	1.453
Neurogen Corporation	23.0	0.010
Hughes Danbury Optical Systems	18.3	<0.001
U.S. Army Connecticut National Guard	13.1	191.014
ABB Combustion Engineering Nuclear Services	12.0	0.196
Ciba-Geigy (ICI Americas)	9.2	0.001
AlliedSignal Engines (Textron Lycoming)	5.6	<0.001
Wesleyan University	5.3	0.001
Uniroyal Chemical Co.	4.1	0.003
Connecticut Resources Recovery Authority	4.1	<0.001
Bristol-Myers Squibb	1.4	0.177
United States Surgical Corporation	1.4	0.014
Eastern CT State University	1.4	<0.001
Bridgeport Hospital	1.2	0.023
Allegheny Ludlum Steel Corp.	0.4	<0.001
Hamilton Chemical	0.4	<0.001
Stanley Works (Laboratory)	0.4	<0.001
Advanced Technology Materials, Inc.	0.2	<0.001
Brass Center, Ltd.	0.2	<0.001
Stamford Public Schools	0.2	<0.001
Hopkins School	0.1	<0.001
Cytec Industries Inc.	<0.1	<0.001
TOTALS	**11,769.9**	**3,087.925**

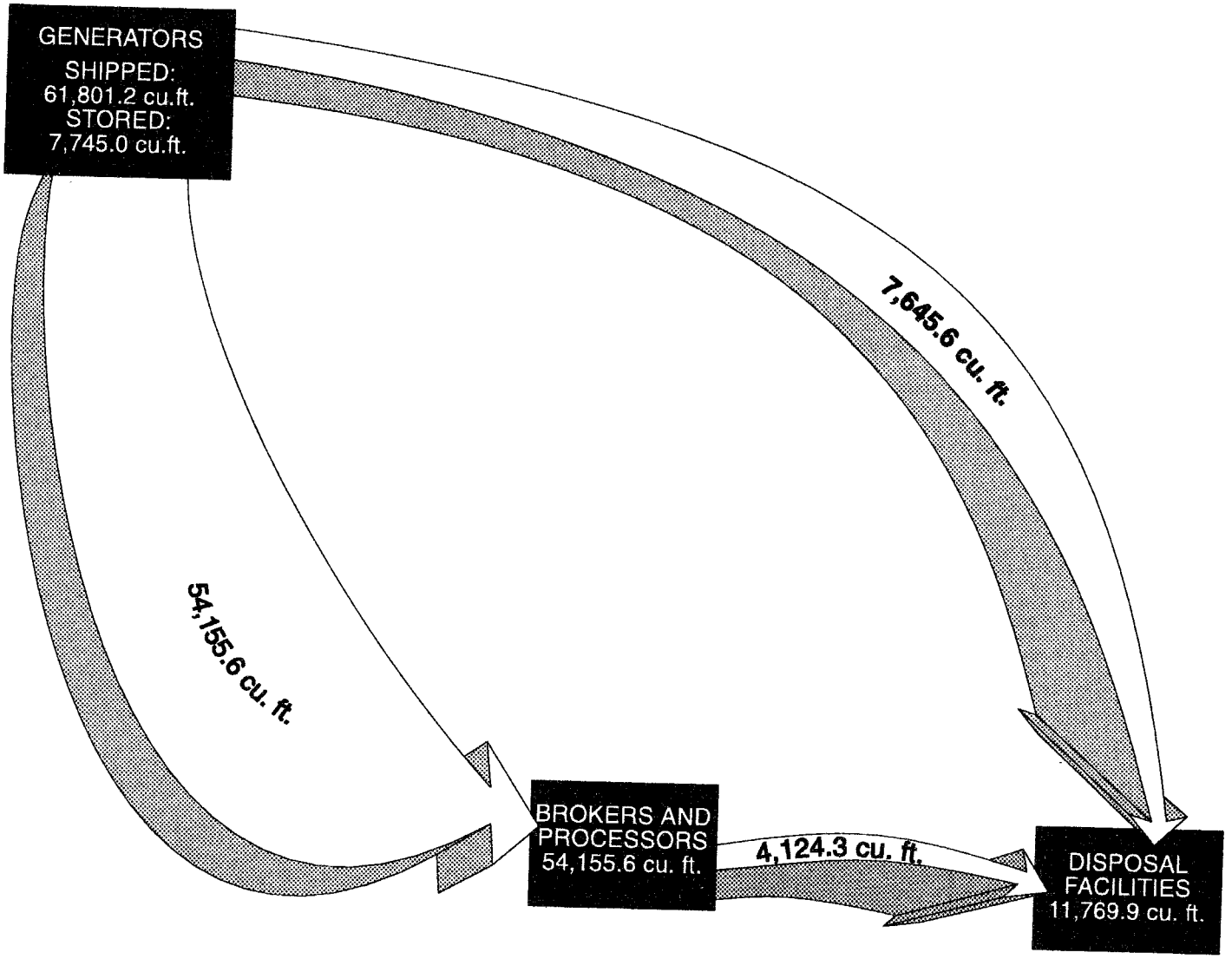
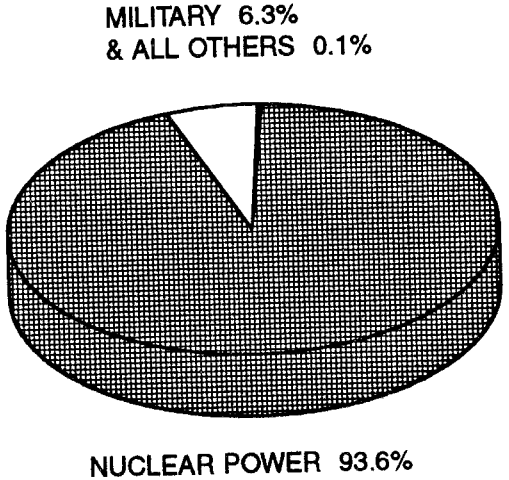


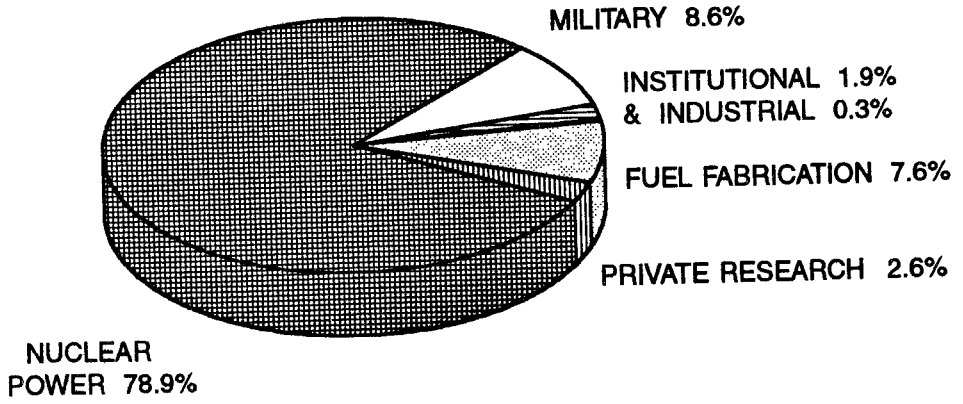
FIGURE 2: PATHS TO DISPOSAL OF CONNECTICUT LLRW DURING 1996

FIGURE 3: CONNECTICUT LLRW SHIPPED TO DISPOSAL FACILITIES IN 1996 - BY CATEGORY OF GENERATOR



RADIOACTIVITY

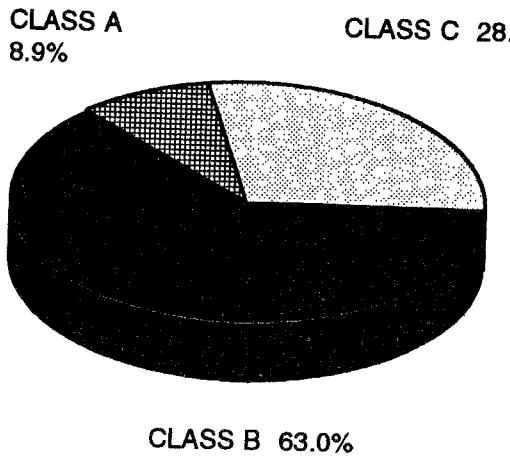
(Percent of 3,087.925 Curies)



VOLUME

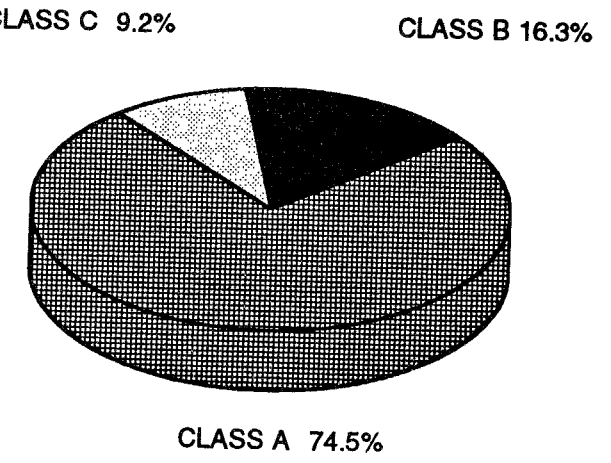
(Percent of 11,769.9 Cubic Feet)

FIGURE 4: CONNECTICUT LLRW SHIPPED TO DISPOSAL FACILITIES IN 1996 - BY NRC WASTE CLASS



RADIOACTIVITY

(Percent of 3,087.925 Curies)



VOLUME

(Percent of 11,769.9 Cubic Feet)

FIGURE 5: VOLUME OF CONNECTICUT LLRW SHIPPED TO DISPOSAL FACILITIES - 1979 THROUGH 1996

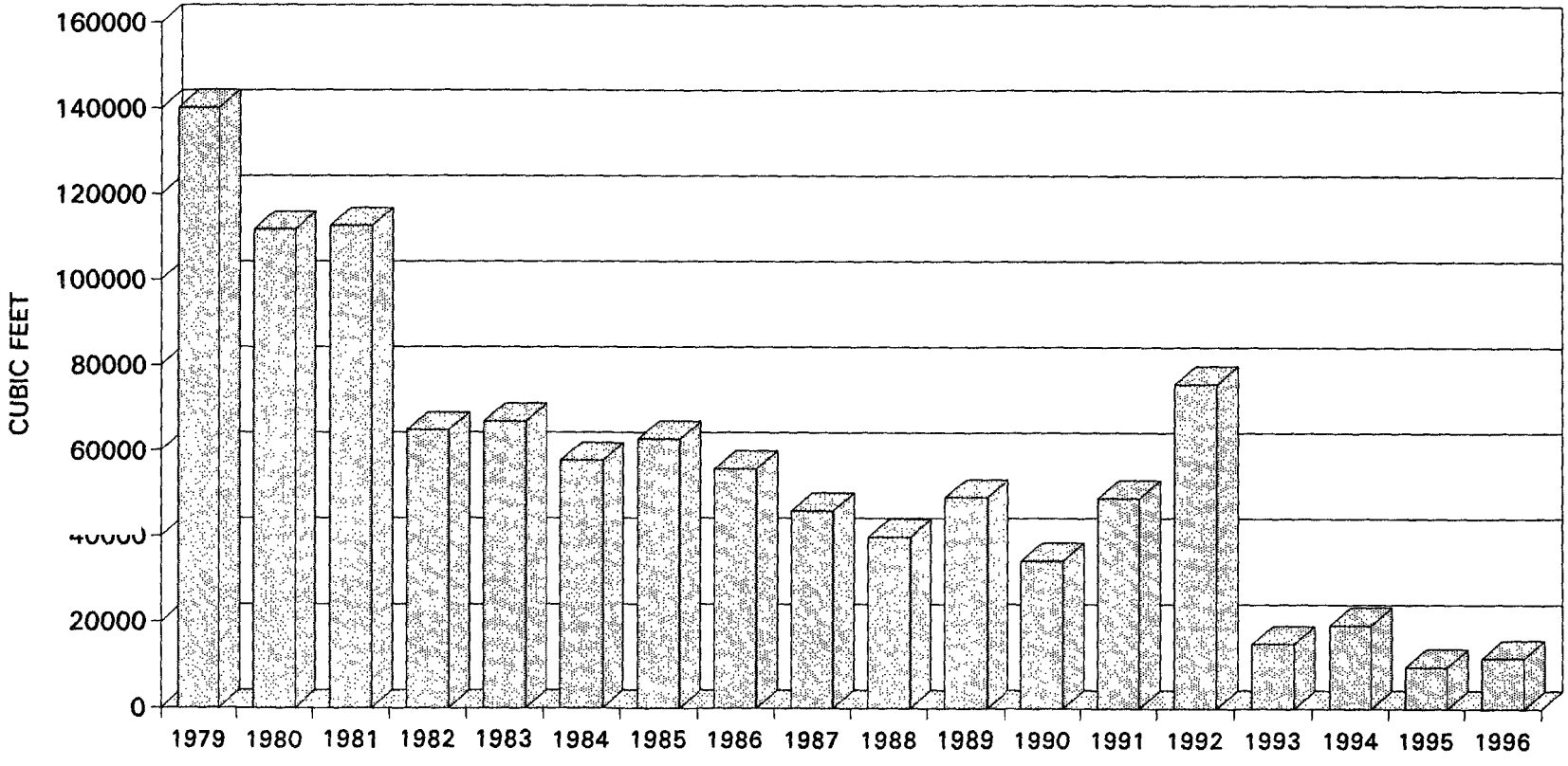
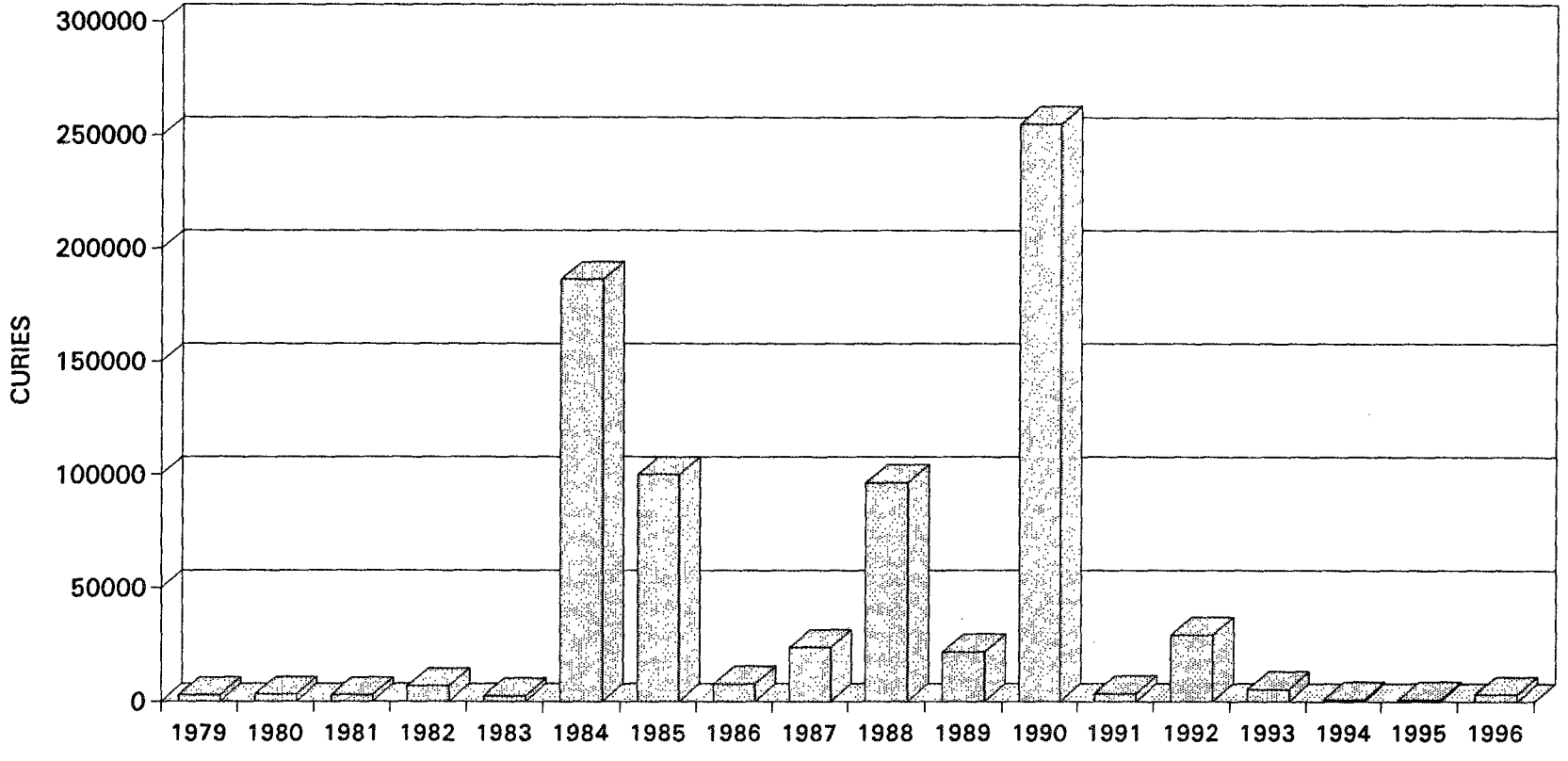


FIGURE 6: RADIOACTIVITY OF CONNECTICUT LLRW SHIPPED TO DISPOSAL FACILITIES - 1979 THROUGH 1996



had been disposed, the total would not have exceeded the lowest pre-1993 annual total (34,233 cubic feet for calendar year 1990).

Thus, for the past four years, Connecticut generators have generated and disposed substantially lower amounts of LLRW than in the previous 15 years. Reasons for the decline include 1) reduction of LLRW inventories prior to January 1, 1993 in anticipation of possible denial of access to disposal capacity thereafter; 2) improved operating procedures at generator facilities, particularly Northeast Utilities' nuclear power plants, which reduced the actual generation of LLRW (source reduction); 3) improved volume reduction during off-site processing for several generator categories, which may be attributable to a large increase in disposal fees at the Barnwell, South Carolina LLRW disposal facility and space constraints for on-site LLRW storage; 4) loss of disposal facility access for Connecticut LLRW during the second half of 1994 and the first half of 1995; and 5) the continuation of on-site storage, rather than resumption of off-site shipments, by a number of generators since the middle of 1995.

Because special circumstances existed during 1993 through 1996, it is not certain that the four-year trend of volume reduction will continue. On the one hand, the downward trend appears to be the result of a change in the LLRW management system that is likely to continue (i.e., higher LLRW disposal fees). On the other hand, all four of Connecticut's nuclear power plants are currently inoperative (December, 1997), having been shut down in 1995 and 1996. NRC consent is required before the Millstone power plants can be restarted. The Connecticut Yankee power plant will not be restarted but will instead be decommissioned. Early decommissioning activities at Connecticut Yankee will generate a substantial quantity of LLRW that was not previously anticipated for management during the next several years.

In addition, Northeast Utilities reports that it plans to dispose a substantial quantity of Class A LLRW at the Envirocare LLRW disposal facility at Clive, Utah in coming years. Because Envirocare will not accept some forms of low-volume processed waste, Northeast Utilities will not ship some waste to off-site processing prior to shipment to Envirocare. Consequently, past volume reductions due to processing may not continue.

The 3,087.925 Curies of radioactivity disposed in 1996 is a relatively low figure. However, had the approximately 53,000 Curies stored on-site by generators (primarily the Millstone 1 nuclear power plant) been disposed, the activity total would have been higher than normal for recent years.

3.4 Off-Site Shipment and Processing of LLRW

When shipping LLRW off-site (see Figure 2), generators can contract directly with a contract carrier, or they can hire a LLRW broker. Generally, a waste broker collects waste from several generators and consolidates it into a single full-truck shipment. In addition, brokers often provide waste classification services, prepare the manifest for the shipment, and package the waste.

After being shipped off-site from generator facilities, LLRW is frequently processed to reduce its volume prior to disposal and/or to achieve a more stable waste form for disposal. The services provided to LLRW generators by the processors include incineration, steam reforming, supercompaction, shredding, decontamination, and metal melting and casting for use as radiation shield blocks. All of the processors are located out of state.

In 1996, thirty-seven generators in the fuel fabrication, institutional, nuclear power plant, industrial, and private research categories shipped 54,155.6 cubic feet of LLRW containing 68.224 Curies off-site by way of brokers and processors. These intermediate facilities, in turn, shipped 4,124.3 cubic feet of LLRW containing 49.624 Curies to disposal facilities.

Thus, for the waste shipped to brokers and processors, Connecticut generators achieved a 92.4% decrease in waste volume through processing. This volume reduction calculation does not take into consideration the fact that the amount shipped to disposal by processors and brokers in 1996 includes some waste held from previous years, or that some waste shipped off-site for management in 1996 was held by processors and brokers at year's end.

3.5 LLRW Disposal Sites Used

Table 3 presents the volume and radioactivity of LLRW shipped to LLRW disposal facilities during 1996, and Figure 7 illustrates the proportion of LLRW disposed at each facility. The majority of the radioactivity (3,087.888 Curies or >99.9%) and volume (11,769.9 cubic feet or 92.4%) was shipped to the Chem-Nuclear LLRW disposal facility at Barnwell, South Carolina, which is a full-service disposal facility.

Additionally, ABB Combustion Engineering Nuclear Products generated and disposed 900.0 cubic feet of low-activity debris in connection with the decommissioning of its Windsor fuel fabrication facility. This material, which constituted 7.6% of the state's LLRW disposal volume in 1996, was disposed at the Envirocare LLRW facility at Clive, Utah. Envirocare specializes in the disposal of high-volume, low-activity LLRW, such as the ABB Combustion Engineering Nuclear Products decommissioning waste. Envirocare's facility is not a full-service disposal facility, and its operating license will not allow it to accept many forms of LLRW.

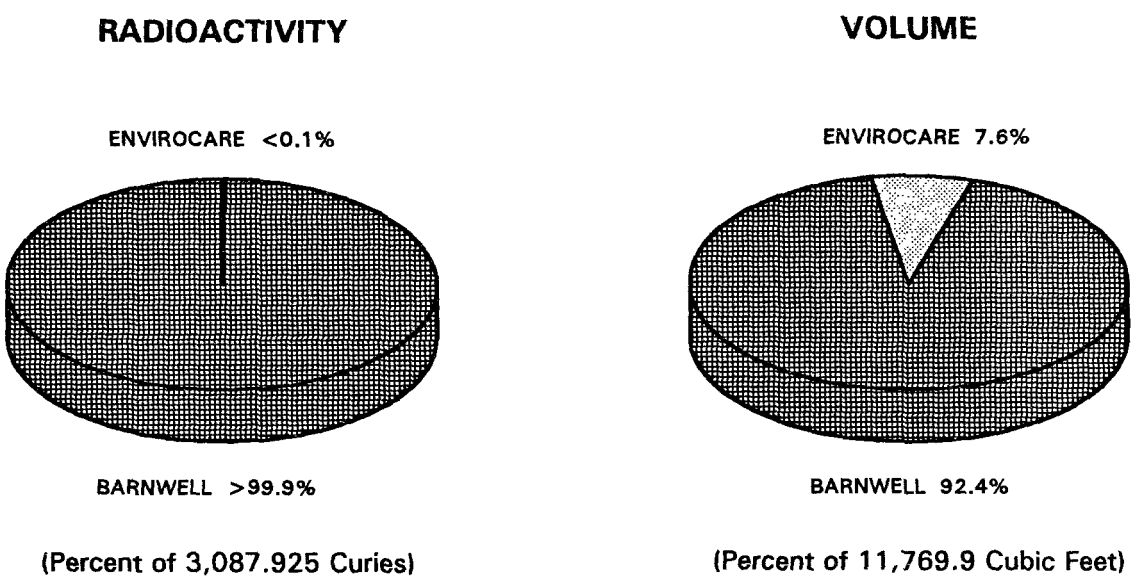
Since January 1, 1993, the Barnwell facility has been the only full-service LLRW disposal facility available to Connecticut generators, albeit on an intermittent basis. On January 1, 1993, the LLRW compacts hosting the three full-service disposal facilities then active became entitled to refuse out-of-compact waste pursuant to provisions of the LLRW Policy Amendments Act of 1985. The Northwest Compact exercised the option by limiting the Richland, Washington facility to waste from the Northwest and Rocky Mountain Compacts only. Additionally, the State of Nevada closed the Beatty, Nevada LLRW disposal facility, and it is no longer accepting waste. Only the Barnwell facility remained open to Connecticut waste, although it did close temporarily to out-of-region generators,

TABLE 3: DISPOSAL FACILITIES USED BY CONNECTICUT GENERATORS IN 1996 - BY CATEGORY OF GENERATOR

CATEGORY OF GENERATOR	BARNWELL, SC VOLUME (cu ft)	BARNWELL, SC RADIOACTIVITY (Curies)	ENVIROCARE, CLIVE, UT VOLUME (cu ft)	ENVIROCARE, CLIVE, UT RADIOACTIVITY (Curies)
FUEL FABRICATION			900.0	0.037
INDUSTRIAL	38.9	0.210		
INSTITUTIONAL	227.0	0.369		
MILITARY	1,010.6	193.016		
NUCLEAR POWER PLANTS	9,290.0	2,891.358		
PRIVATE RESEARCH	303.4	2.935		
TOTALS	**10,869.9**	**3,087.888**	**900.0**	**0.037**

Grand Total Disposed: 11,769.9 cubic feet
3,087.925 Curies

FIGURE 7: DISPOSAL FACILITIES USED BY CONNECTICUT GENERATORS IN 1996



including Connecticut LLRW generators, from mid-1994 to mid-1995. Thus, all of Connecticut's LLRW disposed in 1996 went to the Barnwell facility, excluding the decommissioning waste from ABB Combustion Engineering Nuclear Products.

3.6 Decay of LLRW Shipped Off-Site for Management During 1996

LLRW shipped off-site[b] in 1996 by Connecticut generators contained many different radionuclides having a wide variety of half-lives. "Half-life" is the length of time it takes for the amount of a particular radionuclide to be reduced, through radioactive decay, to one-half of its initial value. Each radionuclide has a specific, measurable half-life. More than half of the radioactivity was associated with radionuclides having relatively short half-lives (i.e., less than 5 years), while some of the radionuclides in the waste have very long half-lives.

Figure 8 depicts the effects of radioactive decay on the amount of radioactivity left at various points in the future in Connecticut LLRW shipped off-site in 1996, including the ingrowth and decay of progeny radionuclides. The amount of radioactivity left after 100 years is 269 Curies, approximately 9% of the original 3,107 Curies. After 500 years, the amount remaining is approximately 11 Curies, less than 1% of the original amount.

4. LLRW Management After 1996

On July 1, 1995, the Barnwell LLRW disposal facility re-opened to waste from outside the Southeast Compact region, including Connecticut waste, following South Carolina's withdrawal from the Southeast Compact. The facility had been closed to out-of-region waste for a year. Thus, beginning during the second half of 1995, Connecticut generators were again able to dispose their LLRW at Barnwell.

At this writing, it is not known how long the Barnwell facility will remain open to Connecticut generators. One indicator of possible stability for the next several years is that the South Carolina Supreme Court upheld legislation that re-opened the Barnwell LLRW disposal facility to out-of-region generators. Thus, on the one hand, it appears unlikely that the South Carolina courts can be used to close the Barnwell facility. On the other hand, increased disposal costs have resulted in less LLRW being shipped to the Barnwell LLRW disposal facility. Consequently, the State of South Carolina has had some difficulty collecting the anticipated amounts of revenue for public education. This

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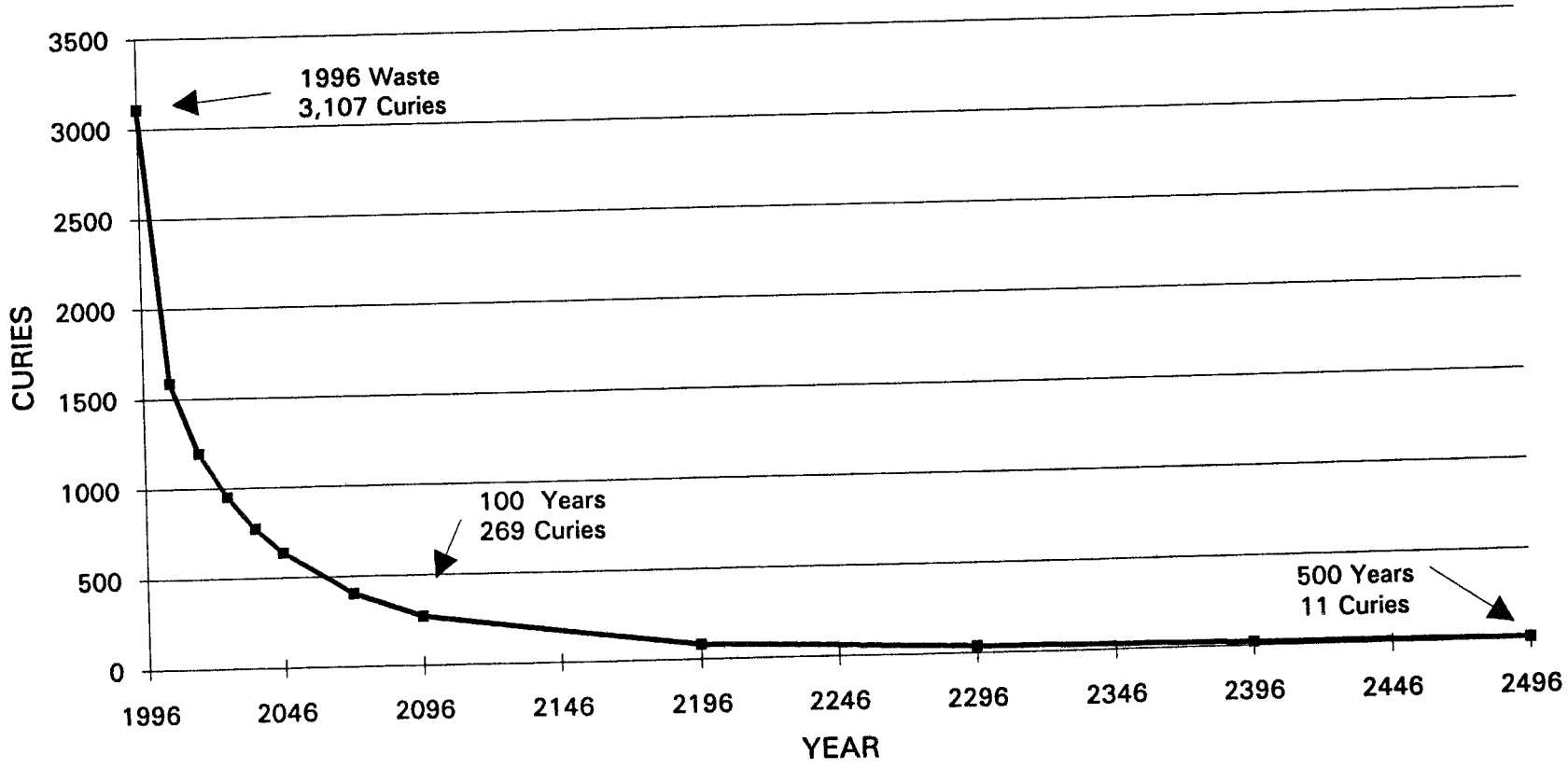
[b]Data gathered for calendar year 1996 contained isotopic composition of LLRW *shipped off-site for management.* This is in contrast to data for prior years which gave the isotopic composition of LLRW actually disposed. Thus, data for 1996 include LLRW that was held over by brokers or processors at the end of 1996 and LLRW that was incinerated or decontaminated. The data exclude waste shipped off-site in previous years and subsequently disposed in 1996.

FIGURE 8: DECAY OF 1996 LLRW SHIPPED OFF-SITE FOR MANAGEMENT FROM CONNECTICUT



weakens a major justification for re-opening the facility in 1995 and strengthens the position of those seeking its permanent closure.

Thus, the national LLRW management arena is in a state of continuing flux and uncertainty for a variety of political and economic reasons. It is not yet clear how long Connecticut can depend on existing out-of-state LLRW disposal capacity. To meet longterm needs for managing the LLRW projected to be generated over the next 50 years (see Table 4[c]), the CHWMS is continuing to move forward with its statutory duties under Connecticut's LLRW management facility siting law to provide for in-state disposal of LLRW. The 1993 LLRW Management Plan, approved by the Connecticut General Assembly in April, 1993, includes a plan for a volunteer approach to LLRW disposal facility siting. Concurrently, the Connecticut Office of Policy and Management and the Northeast Interstate LLRW Compact are seeking to arrange a more permanent out-of-state and out-of-region option for providing LLRW disposal capacity.

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[c]These projections were assembled in September, 1994, well before the December, 1996 announcement by Northeast Utilities that the Connecticut Yankee nuclear power plant would be taken out of service and decommissioned. Early shutdown and decommissioning of Connecticut Yankee will significantly reduce the volume and activity to be disposed in Connecticut's LLRW disposal facility. However, new projections taking these developments into account have not yet been compiled.

TABLE 4: 50-YEAR VOLUME AND RADIOACTIVITY PROJECTIONS FOR CONNECTICUT'S LLRW DISPOSAL FACILITY

	NO LICENSE EXTENSION*		20-YEAR LICENSE EXTENSION*	
	Volume (Cubic Feet)	Activity (Curies)	Volume (Cubic Feet)	Activity (Curies)
CLASS A				
Non-Utility Operations	290,000	1,000	290,000	1,000
Utility Operations	170,000	28,000	340,000	58,000
Utility Decommissioning	790,000	3,000	790,000	3,000
Total	1,250,000	32,000	1,420,000	62,000
CLASS B				
Utility Operations	28,000	21,000	56,000	40,000
Utility Decommissioning	130,000	1,000	130,000	1,000
Total	158,000	22,000	186,000	41,000
CLASS C				
Utility Operations	16,000	530,000	34,000	900,000
Utility Decommissioning	39,000	230,000	39,000	230,000
Total	55,000	760,000	73,000	1,130,000
TOTAL	1,463,000	814,000	1,679,000	1,233,000
NON-UTILITY				
Total	290,000	1,000	290,000	1,000
UTILITY				
Operations	214,000	579,000	430,000	998,000
Decommissioning	959,000	234,000	959,000	234,000
Total	1,173,000	813,000	1,389,000	1,232,000
TOTAL	1,463,000	814,000	1,679,000	1,233,000

* Refers to potential extension of operating licenses for nuclear power plants.

APPENDIX A:

LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT IN CONNECTICUT - 1996

ment, Projections, Disposal Technologies, Transportation and Cost Distribution," and it describes the generation and management of LLRW in Connecticut during 1991.[a]

The CHWMS subsequently published updates to the 1993 Management Plan giving information on LLRW generation and management during the following years:

- 1992 data — "Low-Level Radioactive Waste Management in Connecticut - 1992" (January, 1994)
- 1993 data — "Low-Level Radioactive Waste Management in Connecticut - 1993" (April, 1995)
- 1994 data — "Low-Level Radioactive Waste Management in Connecticut - 1994" (February, 1996)
- 1995 data — "Low-Level Radioactive Waste Management in Connecticut - 1995" (December, 1996).

In keeping with the ongoing duty of the CHWMS to provide LLRW generation and management data on a timely basis, the current report provides information in the following general areas:

- inventory of Connecticut LLRW generators for 1996;
- data on sources, management, volumes, types, and half lives of the LLRW shipped for management and disposal in 1996; and
- description and analysis of LLRW generators and LLRW generated in the state, including types of waste and their volumes, radioactivities, and radionuclide compositions; processing methods; and other information.

This report is a compilation and analysis of data from Annual LLRW Report Forms (generator reports) required by state law [4] to be submitted annually to the Department of Environmental Protection (DEP) by LLRW generators. The generator reports contained information on LLRW management practices during 1996 and were similar to the survey questionnaires provided by the CHWMS and the DEP in previous years.

Unless otherwise noted, the 1987 through 1996 generator reports are the source of data presented and analyzed in this report.

Tables and figures referred to in this report appear at the end of the report.

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[a]Longterm projections of LLRW generation and disposal are presented in a separate CHWMS publication entitled "Projections of Low-Level Radioactive Waste Characteristics and Volumes to be Disposed at the Connecticut LLRW Disposal Facility" dated September 1994 and approved by the General Assembly on April 2, 1995.

An entry on the tables and figures preceded by "<" means that the reported or calculated number rounds to less than the value shown using standard rounding methods.

2. LLRW GENERATOR REPORTS

In April, 1997, CHWMS staff, in conjunction with the DEP Monitoring and Radiation Division, received generator reports from Nuclear Regulatory Commission (NRC) radioactive material licensees in the state and entities registered with the Monitoring and Radiation Division. The generator report questionnaire was mailed by DEP to licensees/registrants who had previously indicated a potential for generating LLRW during calendar year 1996. CHWMS staff also examined disposal records from the Barnwell, South Carolina LLRW disposal facility and the Envirocare facility in Utah to determine whether there were additional generators that should complete the questionnaire. These disposal facility records also served as a benchmark by which to verify individual generator reports.

The form used for the 1996 generator reports was similar in content to the questionnaire used in previous years, other than changes discussed below. As in previous surveys, the form focused on the types of waste that are shipped off-site for disposal or for treatment and subsequent disposal. It is this waste for which the CHWMS must select an appropriate LLRW disposal facility site and technology. The form was prepared by DEP and CHWMS staff and is attached as Appendix B.

Several simplifying revisions incorporated into the 1996 form were made at the request of generators. The 1996 questionnaires sought information on the isotopic composition of LLRW *shipped off-site for management*, rather than LLRW ultimately disposed at licensed LLRW disposal facilities. Additionally, the forms requested less detailed tracking of the waste from generator to disposal, and contained less burdensome instructions.

While the character of the data presented in this report differs somewhat from prior LLRW management reports, the CHWMS does not believe the usefulness of the report has been diminished.

The form also requested information about the amount of LLRW stored on-site by generators at the end of the year and awaiting ultimate disposal as LLRW. Connecticut's LLRW generators were unable to dispose of LLRW during parts of 1994 and 1995 because they, along with generators in most states, had been denied access to the country's two remaining full-service LLRW disposal facilities. During this period of denied access, Connecticut LLRW generators initiated large-scale temporary on-site storage of LLRW. In July, 1995, the Barnwell, South Carolina LLRW disposal facility reopened to most out-of-region generators, including those in Connecticut. However, many generators continued to store significant quantities of LLRW on-site for a variety of reasons. Thus, it was especially important to learn how much LLRW had accumulated on-site and where it was being stored. Information regarding on-site storage capacity was obtained in earlier years. In the event that denial of access to disposal facilities is repeated, the State will need this information to determine how long generators would be able to continue their operations that generate LLRW.

Additionally, the generator report included specific questions about mixed waste generation and storage. Mixed waste meets both the NRC definition of LLRW and the U.S. Environmental Protection Agency (EPA) definition of hazardous waste. According to federal law, states are responsible for providing disposal capacity for mixed waste [5]. On March 23, 1989, the Board of Directors of the CHWMS resolved that the capability and capacity to dispose of mixed waste would be included in the plans for a LLRW disposal facility if the State must ultimately provide disposal capacity for mixed waste in Connecticut.

Of the licensees/registrants who received the 1996 generator report form, all completed and returned it. Incomplete or ambiguous responses were resolved by CHWMS staff contacting generator report preparers by telephone.

3. INVENTORY OF LLRW SHIPPERS

Table AP-1 lists, in alphabetical order, the 63 Connecticut generators that shipped LLRW off-site for management in 1996; disposed waste in 1996 that had been shipped off-site in previous years; and/or held LLRW in on-site storage at the end of 1996. Additionally, Table AP-1 lists six generators that expect to generate LLRW requiring off-site management in at least one year between 1997 and 2001, but which neither generated, stored, shipped, nor disposed LLRW during 1996. Thus, Table AP-1 presents a total of 69 active and potential generators. There are still other facilities in Connecticut that generate LLRW, but they are not included in this study because they manage their waste on-site. Following the generator name, the table indicates the town in which the generator is located and the generator category to which it has been assigned for analytical purposes. Generator categories are described in Chapter 4.

Each of the three nuclear power plants at Millstone Point was considered a separate generator. Additionally, the two distinct divisions of ABB Combustion Engineering that ship LLRW were also considered separate generators. One division of ABB Combustion Engineering fabricated fuel rods and assemblies for nuclear power plants (listed as "Nuclear Products"), and the other provides decontamination and other services to utilities during nuclear power plant refueling shutdowns (listed as "Nuclear Services").

Table AP-2 shows the volume and radioactivity of the LLRW held on-site and shipped off-site and to disposal facilities by the 63 generators that actually stored, shipped, or disposed LLRW during 1996.

3.1 On-Site Storage

An important feature of Connecticut's LLRW management in 1996 was the continuation of large-scale temporary on-site waste storage by generators despite the availability of out-of-state disposal capacity. Prior to 1994, Connecticut's LLRW generators were able to dispose most of their LLRW within a reasonable time after it was generated and maintained only a small inventory of waste on-site from one year to another. For instance, at the end of 1993, Connecticut generators were storing 3,309.0 cubic feet of LLRW for disposal in 1994.

However, as a consequence of national developments in the availability of LLRW disposal capacity, Connecticut generators, as well as generators in many other states, lost access to all full-service LLRW disposal facilities during 1994. On July 1, 1994 they began storing waste on-site indefinitely. By the end of 1994, 40 LLRW generators in 23 Connecticut towns had accumulated and were storing 36,117.631 Curies of radioactivity in 6,101.2 cubic feet of LLRW.

On-site storage of LLRW became the primary management option for Connecticut generators in 1994 as a consequence of federal law and the inability of the states to develop new LLRW disposal capacity. In 1980, Congress had enacted the Low-Level

Radioactive Waste Policy Act (Public Law 96-573) which made each state responsible for providing disposal capacity for the LLRW generated within its borders. Congress recognized that LLRW could be managed most safely and efficiently on a regional basis, so it authorized states to form regional, interstate compacts to undertake their LLRW management responsibilities. As an incentive for states to join LLRW compacts, the law authorized each LLRW compact to exclude from its disposal facilities LLRW generated outside the compact's member states.

Congress amended the LLRW Policy Act in 1985 (Public Law 99-240) by adding milestones and deadlines for states and compacts to meet in developing new disposal facilities. One of the milestones was January 1, 1993, which was the date on which LLRW compacts could start to exclude from their facilities LLRW generated outside the member states.

In June, 1992, the U.S. Supreme Court issued a decision on the constitutionality of the federal LLRW law (*New York v. U.S.*). The Court found that the basic system set up by the law (i.e., the system of interstate compacts to provide disposal capacity and the authority of compacts to exclude waste from their facilities) is constitutional. The Court found that one provision of the law, the so-called "take-title provision", was unconstitutional. Under that provision, beginning January 1, 1996, if a state had not provided disposal capacity for LLRW, and, if requested by a generator, the state would have been obligated to take title to and possession of the generator's waste. If the state didn't take possession of the generator's waste, the state would have been liable for any damages incurred by the generator due to the failure of the state to take possession.

While the take-title provision no longer exists, the authority for LLRW compacts to exclude out-of-compact LLRW remains, having taken effect on January 1, 1993. At the end of 1992, three LLRW disposal facilities were in operation. On January 1, 1993, the State of Nevada and the Rocky Mountain Compact closed the Beatty, Nevada site permanently. On January 1, 1993, the Northwest Compact and the State of Washington restricted access to the Richland, Washington LLRW disposal facility to generators in the Northwest Compact region and, under contract, to generators in the Rocky Mountain Compact region. The Richland facility also accepts naturally occurring radioactive materials (NORM) from states outside these regions because NORM is not covered by the LLRW Policy Act or the 1985 Amendments. The Northwest Compact and the State of Washington have indicated that they do not intend to change their policy on access to the Richland facility. The Southeast Compact and South Carolina allowed the Barnwell, South Carolina disposal facility to accept LLRW from most states, including Connecticut, through June 30, 1994.

Effective July 1, 1994, access to the Barnwell facility was limited to generators in the Southeast Compact region. The Southeast Compact and the State of South Carolina indicated that they did not intend to allow other generators to use the Barnwell facility in the future. No new LLRW disposal facilities had begun operating since January 1, 1993. Therefore, beginning July 1, 1994 when access to the Barnwell facility was restricted, LLRW generators in Connecticut no longer had access to LLRW disposal capacity and began storing LLRW on-site.

On-site storage of LLRW was expected to continue indefinitely. Nonetheless, owing to political and fiscal developments within South Carolina and the Southeast Compact, the Governor and General Assembly of South Carolina enacted legislation which withdrew South Carolina from the Southeast Compact and re-opened the Barnwell facility to LLRW from outside the Southeast Compact region effective July 1, 1995. The State of South Carolina has imposed additional surcharges for the right to dispose LLRW at Barnwell and hopes to collect substantial revenue for public education in South Carolina. In 1996, this legislation was upheld by the Supreme Court of South Carolina.

Although many Connecticut generators resumed LLRW shipments to the Barnwell facility after July, 1995, others continued to store waste on-site during 1996. Reasons cited for this practice are the high costs of disposing LLRW at the Barnwell facility; and lower rates of generating LLRW, which requires a longer time to collect enough LLRW to justify an off-site shipment.

Thus, at the end of 1996, 42 generators in 26 Connecticut towns were storing 52,911.489 Curies of radioactivity in 7,745.0 cubic feet of LLRW. The 42 generators consisted of 23 which only stored LLRW and 19 that stored waste in addition to shipping and/or disposing LLRW.

In summary, the recent history of on-site LLRW storage in Connecticut is as follows:

YEAR	NUMBER OF GENERATORS STORING LLRW ON-SITE	LLRW STORED ON-SITE (ROUNDED)	
		CUBIC FEET	CURIES
1993	26	3,309	<1
1994	40	6,101	36,117
1995	41	7,575	53,829
1996	42	7,745	52,911

At this writing, it is unclear how long generators will continue to store significant quantities of waste on-site and how much waste will ultimately accumulate. Therefore, the CHWMS will continue to monitor the status of on-site LLRW storage in Connecticut. For its part, Northeast Utilities plans to continue shipping LLRW for disposal to reduce the amount of LLRW in on-site storage at Connecticut's nuclear power plants.

3.2 LLRW Disposal

As indicated by Table AP-2, 39 generators shipped a total of 3,106.525 Curies of radioactivity in 61,801.2 cubic feet of LLRW off-site for management, including disposal, in 1996. A total of 3,087.925 Curies in 11,769.9 cubic feet was shipped to disposal facilities by 34 generators. Waste shipped off-site by the remaining six active generators was either incinerated during the year (without leaving a residue requiring disposal as LLRW) or held by brokers and processors at the end of 1996. (Since one generator disposed only waste that had been shipped off-site during 1995, there was a total of 40 active generators that shipped and/or disposed LLRW during 1996.)

Of the total waste disposed during 1996, nuclear power plants contributed 2,891.358 Curies in 9,290.0 cubic feet of LLRW.

Tables AP-3A and AP-3B rank (by radioactivity and volume of waste, respectively) the 34 Connecticut generators that actually disposed LLRW in 1996.

Tables AP-4A and AP-4B compare LLRW disposed at full-service LLRW disposal facilities in 1996 by Connecticut generators with disposal by the other 49 states and the District of Columbia. Table AP-4A ranks the states and D.C. by volume disposed, while Table AP-4B ranks them by radioactivity disposed. Connecticut in 1996 ranked thirteenth in terms of both volume disposed and radioactivity disposed. However, had Connecticut generators disposed the LLRW stored on-site at year's end, Connecticut might have ranked considerably higher in both categories.

Owing to management practices of LLRW brokers and processors, some LLRW shipped off-site in 1996 was held at year's end and not shipped for disposal in 1996. On the other hand, some LLRW disposed in 1996 had been shipped to brokers and processors in prior years. Finally, there are some LLRW radioactivity decreases through decontamination and incineration of LLRW. In combination, all of these factors resulted in a net decrease of 18.600 Curies in the activity of LLRW disposed in 1996 compared to the activity of LLRW shipped off-site during the year.

The number of generators shipping waste off-site or to disposal in recent years is as follows:

YEAR	NUMBER OF GENERATORS SHIPPING LLRW OFF-SITE OR TO DISPOSAL	LLRW SHIPPED OFF-SITE (ROUNDED)		LLRW SHIPPED TO DISPOSAL (ROUNDED)	
		CUBIC FEET	CURIES	CUBIC FEET	CURIES
1987	26	65,514	23,886	45,914	23,886
1988	29	57,388	96,451	39,741	96,450
1989	33	69,065	21,884	49,092	21,884
1990	29	80,100	255,163	34,233	255,160
1991	39	97,765	3,579	48,871	3,586
1992	33	127,021	29,357	75,581	29,357
1993	30	60,578	5,375	15,011	5,372
1994	51	109,900	887	19,338	888
1995	23	55,487	870	9,714	840
1996	40	61,801	3,107	11,770	3,088

Variation in the number of generators relates to several factors. The relatively gradual variations seen before 1994 are probably due, in part, to the existence of small-quantity generators who only need to ship waste every few years. Additionally, while new generators that regularly dispose LLRW have appeared over the years, others have gone out of business or otherwise ceased LLRW-generating operations. On the other hand, the number of generators peaked sharply in 1994 as generators (especially small one-time generators) sought to dispose LLRW before the then-possible closure of the Barnwell, South Carolina LLRW disposal facility to out-of-region waste. Following a year-long denial of access to the Barnwell facility, many Connecticut generators resumed LLRW shipments.

Off-site shipments of LLRW for 1987 through 1996 are covered in Tables AP-5A through AP-5C. Tables AP-6A through AP-6C provide disposal data for the same years.

LLRW shipments fell off sharply beginning in 1993. Reasons for the decline include 1) depletion of LLRW inventories prior to January 1, 1993 in anticipation of possible denial of access to disposal capacity thereafter; 2) improved operating procedures at generator facilities, particularly Northeast Utilities' nuclear power plants, which reduced the actual generation of LLRW (source reduction); 3) improved volume reduction during off-site processing for several generator categories, which may be attributable to a large increase

in disposal fees at the Barnwell, South Carolina LLRW disposal facility and space constraints for on-site LLRW storage; 4) loss of disposal facility access for Connecticut LLRW during the second half of 1994 and the first half of 1995; and 5) the continuation of on-site storage, rather than resumption of off-site shipments, by a number of generators since the middle of 1995.

Because special circumstances existed during 1993 through 1996, it is not certain that the four-year trend of volume reduction will continue.

On the one hand, the downward trend appears to be the result of a change in the LLRW management system that is likely to continue (i.e., higher LLRW disposal fees[b]). Both LLRW generator short-term projections and CHWMS long-term projections predict similar reduced volumes for at least the next five years *for most generators*. Thus, there is a distinct possibility that the 1993 through 1996 data predict the volumes of LLRW requiring disposal that will be generated over the next several years by most generators.

On the other hand, all four of Connecticut's nuclear power plants are currently inoperative (December, 1997), having been shut down in 1995 and 1996. (See Section 4.1, below.) NRC consent is required before the Millstone power plants can be restarted. The Connecticut Yankee power plant will not be restarted but will instead be decommissioned.

Early decommissioning activities at Connecticut Yankee will generate a substantial quantity of LLRW that was not previously anticipated for management during the next several years. Early decommissioning would, however, reduce the amount of waste that would be managed in the more distant future at a Connecticut LLRW disposal facility.

In addition, Northeast Utilities reports that it plans to dispose a substantial quantity of Class A LLRW at the Envirocare LLRW disposal facility at Clive, Utah in coming years. Because Envirocare will not accept some forms of low-volume processed waste, Northeast Utilities will not ship some waste to off-site processing prior to shipment to Envirocare. Consequently, past volume reductions due to processing may not continue.

The CHWMS will continue to closely track LLRW volumes to determine the effect of nuclear power plant outages and decommissioning on the amount and character of LLRW generated in Connecticut, and whether other generators continue to ship reduced volumes of LLRW.

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[b]Since November, 1996, the Barnwell LLRW disposal facility has been charging disposal fees based on weight, dose rate, and Curie content, rather than on volume.

4. CATEGORIES OF LLRW GENERATORS

The NRC has characterized the waste streams for each category of generator in conjunction with the development of its LLRW regulations [6]. The characterization for a particular type of waste includes the identification of the processes that produce it, and its typical physical form, chemical form, and radionuclide content.

The generator categories for this report generally correspond to the NRC's categories. One exception is the "Private Research" category ("Industrial/Institutional" in the 1988 Management Plan). The NRC methodology has "Industrial" and "Institutional" categories, each with its own typical waste streams. In analyzing the survey responses for the 1988 calendar year, CHWMS staff identified a number of waste shippers who were "industrial" (i.e., they were commercial firms rather than universities or hospitals), but whose waste streams were characteristic of "institutional" waste generators.

For example, several industrial firms shipped liquid scintillation waste off-site, but in the NRC impact analysis methodology, liquid scintillation waste is only an institutional waste stream. Therefore, a separate generator category for these generators was established and named "Private Research". This category is identical to the category called "Industrial/Institutional" in the 1988 Management Plan. It was renamed because "private research" more accurately describes the facilities in this category. This usage is also applied in the current report.

Nonetheless, for calendar year 1993 one industrial generator, Canberra Industries, reported generating liquid scintillation waste in a non-research manner. Canberra Industries manufactures radiation detection instruments, including liquid scintillation counters. In the course of demonstrating its products to prospective buyers, Canberra Industries generates liquid scintillation waste. Accordingly, the CHWMS has established a new industrial waste type, N-LIQSCVL, to account for this waste.

The following sections provide a more detailed description of each LLRW generator category and the processes resulting in the generation of LLRW.

4.1 Nuclear Power Plants [7]

In recent decades there have been as many as four commercial nuclear power plants operating simultaneously in Connecticut: Connecticut Yankee in the Haddam Neck section of the Town of Haddam, and Millstone Units 1, 2, and 3 in the Town of Waterford. Between November, 1995 and July, 1996, however, all four plants ceased power-generating operations and have not yet been allowed by the NRC to restart. At this writing, no commercial nuclear power plants are operating in Connecticut. At least one of the plants is to be shut down permanently, and the fate of the other plants is unclear at present.

- Connecticut Yankee is owned and operated by the Connecticut Yankee Atomic Power Company, which is owned by eight New England electric utility companies. Northeast Utilities owns a controlling interest (49%) in the Company. The net electrical generating capacity of Connecticut Yankee is 580 megawatts (MWe). The plant has a Westinghouse pressurized water reactor. It went into operation in 1967 and its operating license is scheduled to expire in 2007.

  Status: Connecticut Yankee was taken off-line on July 22, 1996 so that a safety analysis could be conducted. On December 5, 1996, Northeast Utilities announced that the plant would be shut down permanently. The company has determined that the cost of operating Connecticut Yankee for the remainder of its license would exceed the cost of obtaining replacement power elsewhere.

- Northeast Utilities, which operates the three Millstone Units, wholly owns Units 1 and 2, and owns the majority interest (68%) in Unit 3. Northeast Utilities is the parent company of Connecticut Light and Power Company, which provides electric service to most of Connecticut. Other operating companies owned by Northeast Utilities are Western Massachusetts Electric Company, Holyoke Water Power Company, and Public Service of New Hampshire.

  Millstone Unit 1 is a 660 MWe General Electric boiling water reactor, which went into operation in 1970 with its operating license scheduled to expire in 2010. **Status**: Millstone Unit 1 was shut down on November 4, 1995 for refueling. It has not been allowed to restart.

  Millstone Unit 2 is a 870 MWe Combustion Engineering pressurized water reactor, which went into operation in 1975 with its operating license scheduled to expire in 2015. **Status**: Millstone Unit 2 was shut down on February 20, 1996. It has not been allowed to restart.

  Millstone Unit 3 is an 1150 MWe Westinghouse pressurized water reactor, which went into operation in 1985 with its operating license scheduled to expire in 2025. **Status**: Millstone Unit 3 was shut down on March 30, 1996. At this writing (December, 1997) Northeast Utilities expects a restart inspection by the NRC to take place in early 1998.

The pertinent information about the four nuclear power plants is summarized as follows:

CONNECTICUT NUCLEAR POWER PLANTS

PLANT	NET CAP. (MWe)	REACTOR MANUFACTURER	TYPE*	BEGAN OPER.	LICENSE SCH. TO EXPIRE	OFF LINE
CONNECTICUT YANKEE	580	Westinghouse	PWR	1967	2007[c]	7/96
MILLSTONE UNIT 1	660	General Electric	BWR	1970	2010	11/95
MILLSTONE UNIT 2	870	Combustion Engineering	PWR	1975	2015	2/96
MILLSTONE UNIT 3	1150	Westinghouse	PWR	1985	2025	3/96

* PWR - Pressurized Water Reactor BWR - Boiling Water Reactor

During normal operations, the LLRW generated by nuclear power plants comes from maintenance and refueling activities. The primary source of radioactivity in the LLRW at these plants normally is contaminants that build up in the reactor coolant. The contaminants are produced by neutron activation of trace materials and corrosion products, and by radionuclide leakage from fuel elements into the reactor coolant. However, in 1988, 1990, and 1992, the primary source of radioactivity in waste shipped from the plants was contaminated or activated metal equipment.

Recent developments at Connecticut's commercial nuclear power plants are likely to have a significant impact on the quantity and characteristics of LLRW generated and managed in coming years. Most significantly, the closure and decommissioning of Connecticut Yankee will generate an estimated 275,000 cubic feet of LLRW containing approximately 26,000 Curies of radioactivity over approximately 5 years. [Personal communication, Wolf Koste, Supervisor of Radwaste Engineering, Northeast Utilities, August, 1997.]

4.2 Fuel Fabricators

Fuel fabrication is the final step in the uranium fuel cycle before the uranium becomes fuel for light water reactors. Enriched uranium hexafluoride is shipped to commercial and military fuel fabrication facilities that convert the enriched uranium hexafluoride to uranium oxide pellets. The pellets are loaded into rods and the rods are configured to form fuel assemblies. Until recently, there were two fuel fabricators in Connecticut.

Prior to 1994, ABB Combustion Engineering Nuclear Products produced fuel assemblies in Connecticut for the commercial nuclear power industry. The fuel pellets were

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[c]As discussed above, Connecticut Yankee will not operate for the full duration of its NRC license.

manufactured in Missouri and the fuel assemblies were put together in Connecticut. At one time, fuel pellets were manufactured in Connecticut as well, but this activity had previously been moved out of Connecticut. The ABB Combustion Engineering fuel assembly facility ceased manufacturing operations on September 30, 1993, and was being decommissioned during 1994, 1995, and 1996.

The other facility, United Nuclear Corp., manufactured fuel assemblies for the U.S. Navy. United Nuclear Corp. has discontinued these operations and facility decommissioning was completed in 1993. The United Nuclear Corp. facility has been converted to new use as the Mohegan Sun Casino.

4.3 Institutional and Private Research Facilities

Medical care and research facilities, academic research institutions, and government facilities are included in the institutional category of generators. Commercial firms (which would otherwise be classed as industrial facilities) that generate waste essentially identical to the waste generated by institutional facilities make up the private research category.

Waste produced by medical sources results from the use of radioactive materials in the practice of medicine. Nuclear medicine, which involves the use of radionuclides for diagnosis and therapy, is widely practiced. Most of the radionuclides used in nuclear medicine have short half-lives.

Bioresearch waste results from the use of radioactive materials in biochemical, biophysical, and physiological investigations. This type of research uses various radionuclides as tracers in test animals and labeling of organic chemicals to study reactions and obtain basic data. Tritium (hydrogen-3), with a half-life of 12.3 years, is the principal radionuclide found in the waste.

LLRW is also generated through research in physics, inorganic chemistry, materials analysis, and geology. Some LLRW is also produced through the instructional or classroom use of radioactive materials.

4.4 Industrial Facilities

This category includes all other commercial producers of LLRW. Many industrial activities are directly related to those of other generators, such as providing assistance during outages at nuclear power plants. Others manufacture consumer products.

This category also includes LLRW generated in the production of products for the military (e.g., aircraft engines, helicopters, and tanks). However, LLRW generated in servicing these products (i.e., after they have been turned over to the military), is included in the military category.

4.5 Military Facilities

Nearly all of the LLRW generated within the military category in Connecticut is associated with the maintenance of nuclear powered submarines. Most of this waste is generated by the Navy itself, but the Navy uses a civilian contractor, the Electric Boat Division of General Dynamics, for some maintenance. Shipments from the civilian contractor are infrequent but, when they occur, are assigned to this category.

In 1996, the U.S. Army Connecticut National Guard disposed a significant volume and activity of luminescent tritium-bearing dials and devices.

5. OFF-SITE DISPOSAL SHIPMENTS

The volume and radioactivity of LLRW shipped off-site for management and to disposal facilities in 1996 are indicated for each generator and each category of generator in Table AP-7.

Tables AP-8 and AP-9 show the volume and radioactivity of LLRW shipped off-site and to disposal facilities in 1996 by category of generator, as well as the percentages of the total volume and activity contributed by each category.

Proportions of the volume and activity of LLRW shipped to disposal facilities by each generator category are illustrated in Figure AP-1.

A comparison of category subtotals in Table AP-7 for volume shipped off-site and volume shipped for disposal shows that most generator categories achieved significant volume reductions due to off-site processing during 1996. Chapter 7 provides information about off-site processing facilities and on-site volume reduction techniques.

As Tables AP-8 and AP-9 and Figure AP-1 demonstrate, nuclear power plants in Connecticut accounted for most of the radioactivity and more than three-quarters of the volume of LLRW shipped off-site for management and shipped to disposal facilities in 1996. Thus, apart from the large activity disposed by the U.S. Army Connecticut National Guard, 1996 was a typical year for Connecticut in terms of the overall volume and activity distribution.

very significant portion of the total radioactivity disposed. The Millstone 1 nuclear power plant has reported that it was storing 53,000 Curies in 320 cubic feet of B-NFRCOMP at the close of 1995, none of which was shipped off-site during 1996.

6.1.7 Metal Sent for Decontamination - O-METDCON

Unlike irradiated metallic hardware which contains radioactivity throughout its entire volume, some metal items such as tools and scaffolding are contaminated only by radioactive particles adhering to their surfaces. This surficial contamination can be removed by a variety of processing techniques, resulting in non-radioactive metal that may be released for unrestricted use. The radioactive material removed must be disposed as LLRW.

Waste radioactive metal fitting this description is generally shipped by the nuclear power plants as P-NCTRASH or B-NCTRASH. However, for the year 1989, Northeast Utilities utilized a separate waste stream designation of O-METALDECON (later shortened to O-METDCON by the CHWMS) to account for this material.

6.1.8 Mixed Waste - O-MIXWAST

As noted earlier, mixed waste is waste that meets both the NRC definition of LLRW and the U.S. Environmental Protection Agency (EPA) definition of hazardous waste. Nuclear power plants have generated a variety of mixed wastes in the course of their operations, primarily spent freon, lead paint chips, and organic solvents. The power plants have been accumulating their mixed waste for a number of years due to a nationwide lack of treatment and disposal capacity for most forms of mixed waste. However, during 1996, the power plants shipped 119.4 cubic feet of O-MIXWAST off-site for processing. They were storing an additional 504 cubic feet of mixed wastes at the end of 1996. (Please refer to Chapter 12 for a more complete discussion of mixed waste.)

6.1.9 Miscellaneous Nuclear Power Plant Wastes - O-MISCLNS

Beginning in 1995, the Millstone nuclear power plants have shipped relatively small quantities of pump oils and floor-drain sludges off-site for management as LLRW. Rather than create two new waste type codes for these probably intermittent forms of waste, CHWMS staff carried these wastes in a single new "miscellaneous" waste stream denoted O-MISCLNS. Should other forms of non-recurring waste appear in the future, O-MISCLNS will be used for those wastes as well.

6.2 Fuel Fabricators

LLRW shipped to disposal facilities from fuel fabricators has usually consisted primarily of combustible/compactible trash (F-COTRASH) (paper, plastic, and spent filters) and

noncombustible/noncompactible trash (F-NCTRASH) (tools and equipment). During 1996, ABB Combustion Engineering Nuclear Products was decommissioning its facility in Windsor. As a result of this work, it disposed 900 cubic feet of decommissioning debris at the Envirocare LLRW disposal facility at Clive, Utah during 1996. These decommissioning wastes were classified by the CHWMS as F-NCTRASH for the purpose of this report.

ABB Combustion Engineering Nuclear Products also shipped 3.8 cubic feet of a lead-cadmium-and-uranium-bearing mixed waste liquid off-site for processing. This waste is listed in this report as F-MIXWAST.

6.3 Institutional and Private Research Facilities

The NRC has divided institutional waste streams into those generated by large facilities (-) and those generated by small facilities (+). As characterized by the NRC, there is no difference in the radionuclide composition of large and small facility waste streams. Therefore, for the 1988 and 1993 Management Plans and subsequent updates, each set of waste streams that have been divided by the NRC into separate streams for large and small facilities have been combined into one waste stream. The combined streams are identified by an equal sign (=).

Institutional and private research activities produce several types of LLRW which are described below.

6.3.1 Combustible/Compactible Trash - I=COTRASH

Protective clothing, gloves, plastic, rags, paper and packaging materials are typical wastes from all institutional and private research sources.

6.3.2 Noncombustible/Noncompactible Trash - I=NCTRASH

Several institutional and private research generators have reported shipping noncombustible/noncompactible trash. The NRC does not have an institutional waste stream for this trash. The CHWMS included one and designated it "I=NCTRASH".

6.3.3 Liquids - I=ABSLIQD, I=MWORLQD, and I=AQULIQD

Most liquids associated with the medical use of radionuclides are aqueous, i.e., in a water solution. These include washings from contaminated laboratory equipment in research facilities. In addition, organic laboratory solvents such as alcohols, aldehydes, ketones, and organic acids are waste components commonly associated with bioresearch. These liquids are generally absorbed before they are shipped to a disposal facility, hence this waste stream is denoted I=ABSLIQD. The NRC requires that waste shipped to a disposal

facility contain as little free standing liquid as is reasonably achievable, but in no case may free standing liquid exceed 1% of the volume of the waste [9].

In recent years, generators have shipped bulk free-standing liquids (not absorbed) off-site for processing. Beginning in 1992, generators have shipped small volumes of mixed waste organic liquids containing trace levels of radioactivity off-site for management by incineration. To account for this waste stream, the CHWMS has created the designation I=MWORLQD. In 1993, Yale University shipped 0.005 Curies in four cubic feet of bulk aqueous liquid LLRW off-site for management. This waste was processed to zero volume by evaporation when fed into the SEG LLRW incinerator at Oak Ridge, Tennessee as a coolant. A new waste stream, I=AQULIQD, was established by the CHWMS to account for this waste. In 1994 the CHWMS expanded the definition of I=ABSLIQD to include solidified liquids, as well as absorbed liquids.

6.3.4 Liquid Scintillation Vial Waste - I=LIQSCVL

Liquid scintillation vial waste consists of an organic fluid (usually toluene) in a plastic or glass vial. The organic fluid reacts to collisions with radiation emissions and gives off flashes of light that are detected and counted by a scintillation counter. Because it is able to measure radioactivity in extremely small concentrations, liquid scintillation is considered a very useful tool in bioresearch. Liquid scintillation waste includes both the liquid and the vial, although sometimes the two are managed separately.

6.3.5 Biological Waste - I=BIOWAST

These wastes consist mainly of the carcasses of animals used in biological research. Animal bedding and excreta, and culture media using radioisotopes are also included in this waste type.

6.3.6 Sealed Sources - I=MISCSOR and I=RAMISCL

These wastes consist of radioisotope sources used for calibration and measurement. Because they must sometimes be disposed, the CHWMS has defined a waste stream for miscellaneous sources (I=MISCSOR) and one for radium sources (I=RAMISCL).

6.4 Industrial Facilities

Industrial facilities generate low activity trash (N=LOTRASH). This waste stream is comparable to the combustible/compactible trash and noncombustible/noncompactible trash waste streams for the other categories of generators. As with the institutional waste streams, the NRC distinguishes between large (-) and small (+) facilities. However, for the 1988 and 1993 Management Plans and subsequent updates, the two have been combined into one waste stream (=). The second industrial waste stream generated in

Connecticut is low activity waste (N-LOWASTE) from the use of radioactive material in the manufacture of aircraft products.

TRASH and WASTE differ in that TRASH is items such as tools, gloves, or equipment that have become contaminated with radioisotopes while WASTE is actual waste radioactive material. For instance, some industrial facilities use radioactive metal alloys. The filings or turnings that result from the machining of these alloys are WASTE, while tools or gloves that become contaminated with the radioactive alloy are TRASH.

Because industrial generators must sometimes dispose sealed sources used in their operations, the CHWMS has added a waste stream denoted as miscellaneous sealed sources (N-MISCSOR). Some of these sealed sources must be disposed as Class C LLRW.

The CHWMS has added a waste stream for liquid scintillation wastes generated in a non-research manner by industrial generators. This waste stream has been given the designation N-LIQSCVL. The CHWMS has also added industrial categories for solidified aqueous liquids (N-SOAQLQD), naturally occurring radioactive materials (N-NORM), and mixed waste (N-MIXWAST).

6.5 Military Facilities

Military generators in Connecticut include the U.S. Navy, a civilian contractor of the Navy, and the U.S. Army Connecticut National Guard.

U.S. Navy and civilian contractor facilities normally generate three types of waste: Dry waste, wet waste, and mixed waste. The dry waste (M-NAVYDRY) consists of dry compressible material, contaminated equipment, and other waste comparable to the combustible/compactible and the noncombustible/noncompactible trash types of waste for other categories of generators. The wet waste (M-NAVYWET) consists of solidified ion-exchange resins and liquids. The designation "wet" refers to the waste as generated, not to the waste as shipped. Military wet waste is solidified or dewatered before shipment for disposal. Military waste shipped to commercial disposal facilities must meet the same NRC requirements as commercial waste regarding free standing liquid (as little as is reasonably achievable, but in no case exceeding 1% of the volume of the waste).

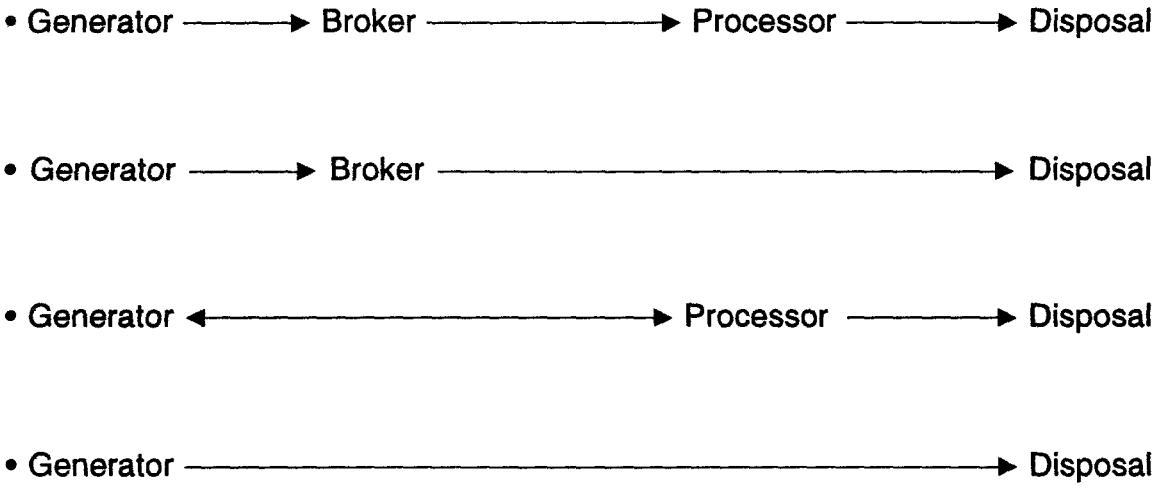
In 1995, a military generator (General Dynamics Electric Boat Div.) reported the generation of mixed waste. This waste consisted of lead-bearing paint chips and mercury/silver solutions. Accordingly, CHWMS staff denoted an additional waste stream as M-MIXWAST.

In 1996, the U.S. Army Connecticut National Guard disposed 191 Curies of radioactivity in 13 cubic feet of LLRW. This waste consisted primarily of tritium-bearing luminescent dials and other devices and has been classified in this report as M-ARMYWST.

7. LLRW MANAGEMENT FACILITIES USED

Tables AP-11A and AP-11B and Tables AP-12A and AP-12B provide data about the volume and activity of the LLRW held on-site and shipped to off-site waste management facilities by Connecticut generators in 1996. Tables AP-11A and AP-11B present data by generator, and Tables AP-12A and AP-12B present data by waste stream.

LLRW shipped off-site can travel along a number of "paths" before management is complete:



For the purposes of this report, brokers and processors have been grouped together as "intermediate" waste handlers.

7.1 Methods of Shipping LLRW

When shipping LLRW off-site, the generator can contract directly with a carrier (transporter) or the generator can hire a LLRW broker.

Generally, a waste broker collects waste from several generators and consolidates it into a single full-truck shipment. In addition, brokers often provide waste classification services, prepare the manifest for the shipment, and package the waste. These are important services for the smaller generators.

Table AP-13 identifies the LLRW brokers and processors used by Connecticut generators in 1996, indicates the generator categories that ship LLRW using these intermediates, and shows volumes shipped via various combinations of brokers and processors.

In 1996, 87.6% of LLRW shipped off-site for management went through intermediates. It is clear from the 1996 data that waste brokers are especially important to industrial,

institutional, and private research LLRW generators. Nuclear power plant, fuel fabrication, and military generators, on the other hand, did not utilize brokers.

Some generators use contract carriers solely or contract carriers in addition to brokers. Contract carriers, as contrasted to brokers, merely transport pre-packaged LLRW without providing additional waste management services to generators. Thus, the task of classifying and packaging the waste remains with the generator. In recent years, 95 - 99% of the volume and activity shipped off-site by LLRW generators has been transported by contract carriers.

7.2 LLRW Processing/Treatment Facilities Used

LLRW is frequently sent out-of-state for processing that is primarily directed at volume reduction and stabilization. Table AP-14 gives, by generator category, the volumes and activities of LLRW shipped for management by way of various brokers and processing facilities in 1996, the processing methods utilized, and the percent volume reduction achieved through processing.

The services provided to LLRW generators by processors include incineration, high temperature and high pressure "steam reforming", supercompaction, shredding, solidification, decontamination, and metal melting and casting for use as radiation shield blocks.

In 1996, thirty-seven generators in the fuel fabrication, institutional, nuclear power plant, industrial, and private research categories shipped 54,155.6 cubic feet of LLRW containing 68.224 Curies off-site by way of brokers and processors. These intermediates, in turn, shipped 4,124.3 cubic feet of LLRW containing 49.624 Curies to disposal facilities.

Thus, for the waste shipped to brokers and processors, Connecticut generators achieved a 92.4% decrease in waste volume through processing. This volume reduction calculation does not take into consideration the fact that the amount shipped to disposal by processors and brokers in 1996 includes some waste held from previous years, or that some waste shipped off-site for management in 1996 was held by processors and brokers at year's end.

Additionally, the net decrease of 18.600 Curies in the activity of LLRW disposed in 1996 compared to the activity of LLRW shipped off-site during the year is partly a result of processing (decontamination and incineration). However, most of this difference is accounted for in the waste held at year's end by brokers and processors.

In 1996, as in previous years, the military did not utilize brokers or processors.

At present, the CHWMS expects that the broker and processor services used in 1996 will remain available to Connecticut generators in coming years.

7.3 LLRW and Mixed Waste Volume Reduction

It is the policy of the State of Connecticut to encourage generators to develop and implement new on-site LLRW and mixed waste volume reduction and stabilization practices and to use, to the extent possible, off-site LLRW and mixed waste treatment facilities in order to reduce the volume of waste they ship for disposal. One of the goals of waste treatment is to improve the waste form being sent on to disposal sites.

As provided in the 1993 Management Plan, the CHWMS has established a technical assistance program for LLRW generators directed at minimizing the volume and radioactivity and improving the waste form of LLRW generated in Connecticut.

A number of the state's generators report enhanced on-site efforts between 1993 and 1996 to reduce the generation of LLRW. One of the most effective means utilized is controlling the entry of materials into areas where they could become contaminated by radioactivity. Because less material is being contaminated, less requires subsequent processing for volume reduction.

7.4 LLRW Disposal Facilities Used

Table AP-15 and Figure AP-2 indicate the volume and radioactivity of LLRW shipped to each disposal facility by Connecticut generators during 1996. The majority of the radioactivity (>99.9%) and volume (92.4%) of LLRW generated in Connecticut was shipped to the Chem-Nuclear LLRW disposal facility at Barnwell, South Carolina. Unlike most previous years, the Barnwell facility was the only full-service LLRW disposal facility available to Connecticut generators.

As noted earlier, ABB Combustion Engineering Nuclear Products generated and disposed 900.0 cubic feet of low-activity debris in connection with the decommissioning of its Windsor fuel fabrication facility. This material, which constituted 7.6% of the state's LLRW disposal volume in 1996, was disposed at the Envirocare LLRW facility at Clive, Utah. Envirocare specializes in the disposal of high-volume, low-activity LLRW, such as ABB Combustion Engineering Nuclear Products' decommissioning waste. Envirocare's facility is not a full-service disposal facility, and Envirocare's operating license will not allow it to accept many forms of LLRW generated in Connecticut.[d]

7.5 Status of LLRW Disposal Facility Siting in Connecticut

At this writing, it is not known whether the Barnwell facility will remain open to Connecticut generators for the long term.

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[d]During 1997 Northeast Utilities began disposing some of its LLRW at the Envirocare facility. The CHWMS does not yet have data concerning this waste, but the waste will be quantified and characterized in data expected to be received in the spring of 1998.

To meet future needs, the CHWMS is continuing to move forward with its statutory duties under Connecticut's LLRW management facility siting law to provide for in-state disposal of LLRW. The 1993 LLRW Management Plan, approved by the Connecticut General Assembly in April, 1993, includes a plan for a volunteer approach to LLRW disposal facility siting.

The CHWMS made progress in implementing the volunteer approach during 1995 and 1996. However, during 1995 significant changes occurred in the national LLRW management situation that have led to changes in the CHWMS's schedule for implementing the volunteer approach. The changes in the national situation include the following:

- The State of South Carolina reopened the Barnwell, South Carolina LLRW disposal facility to LLRW generators throughout the country, except North Carolina;

- The Envirocare of Utah, Inc. LLRW disposal facility began to aggressively market its disposal services for high-volume, low-radioactivity waste and to work with its regulator to expand the types of LLRW that can be disposed there;

- The State of South Carolina withdrew from the Southeast LLRW Compact and announced its intention to form a new compact or to join an existing one; and

- A new LLRW management concept called "assured isolation"[e] was proposed.

As a result of the first change, South Carolina's reopening of the Barnwell LLRW disposal facility, LLRW generators in Connecticut now have access to a full-service LLRW disposal facility (although at a significantly higher price than previously because South Carolina has imposed a substantial surcharge on LLRW disposed at the Barnwell facility). It is, however, uncertain how long this access will continue.

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[e]"Assured isolation," originally referred to as "assured storage," is a concept that was proposed in an article in *Radwaste Magazine*. Assured isolation is storage of LLRW for an indefinite period of time. According to the authors, assured storage/isolation facilities "will have many robust features such as concrete buildings and overpacks for waste that are now common to engineered disposal facilities proposed by the states and compact regions. The assured storage facility will also have some unique features that do not rely on the long-term performance of the site and that take advantage of the fact that inspection and maintenance will continue indefinitely. Over succeeding generations, the assured storage facility would provide its overseers the multiple options of continuing to monitor and maintain the system at a level justified by its past performance, to close and seal the facility partially or completely, or to transfer the waste to another location and decommission the facility." W.F. Newberry, T.A. Kerr, and D.H. LeRoy, "Assured Storage Facilities: A New Perspective on LLW Management," *Radwaste Magazine*, Volume 2, No. 5 (September, 1995).

There are two primary reasons for the uncertainty about how long access will continue to the Barnwell facility. First, the South Carolina legislation that reopened the Barnwell facility does not set a closure date for operation of the site, but in statements preceding the legislation, state officials speculated that at the projected annual disposal volumes, the site could operate for about 10 years before reaching its licensed capacity. Disposal volumes, however, have been lower than projected. The second reason for the uncertainty about how long Barnwell will remain open is the fact that its operation has been a volatile political issue in South Carolina. Over the past decade, the status of the Barnwell facility been the subject of several policy changes and a major lawsuit that was decided by the South Carolina Supreme Court. It is possible that the present policy of open access could change during any legislative session.

While regaining access to disposal capacity was a consideration, the primary factor that has led to changes in the CHWMS's schedule is the CHWMS's examination of the assured isolation concept. The other changes in the national situation, particularly regaining access to disposal capacity, have had a significant influence on determining how much time the CHWMS would be allowed to study the assured isolation concept. (The change in schedule has important side benefits in that it also allows ample time for the State to explore any potential out-of-state opportunities.)

The CHWMS is now involved in two studies on assured isolation including one on the cost of such a facility for Connecticut and another that looks at the potential legal and liability issues associated with the concept.

If the development of an assured isolation facility is going to be considered as an alternative to a disposal facility, it is important that everyone involved in the volunteer siting process knows that an assured isolation facility is an option before a town begins serious consideration of volunteering. With the reopening of the Barnwell LLRW disposal facility to Connecticut LLRW generators and the continued availability of the Envirocare of Utah LLRW disposal facility for some types of LLRW, Connecticut LLRW generators now have access to LLRW disposal facilities. They no longer have to store their LLRW on site. This makes it possible for the CHWMS and the State to continue their consideration of the assured isolation concept. The CHWMS will postpone inviting towns to participate in the volunteer siting process until that consideration is completed. However, regardless of its progress in studying assured isolation, the CHWMS will consult with the Office of Policy and Management and the Northeast Interstate LLRW Compact Commission on the prospects for reliable, long-term access to out-of-state and out-of-compact disposal capacity before inviting towns to participate in the volunteer siting approach, regardless of the type of facility proposed for development.

8. LLRW CLASSES

Tables AP-16 and AP-17, and Figure AP-3 provide information on the distribution of the waste shipped to disposal facilities in 1996 among the waste classes established by the NRC. [10] The classification system is explained in detail in Appendix C of the 1993 Management Plan, Volume 1. Basically, the class to which LLRW is assigned depends on the concentration of certain radionuclides in the waste. Class A waste has the lowest concentration limits for both short- and long-lived radionuclides. Class B waste has higher concentration limits for short-lived radionuclides but the same upper limits for long-lived radionuclides as Class A waste. Class C waste has the highest concentration limits for both short- and long-lived radionuclides. There is no provision in the NRC regulations for defining Class B waste by long-lived radionuclide content; thus LLRW classified on the basis of long-lived radionuclides is either Class A or Class C.

Class A waste contains types and quantities of radionuclides that will decay to acceptable levels as determined by the NRC during the 100-year institutional control period [11]. The NRC requires that Class B LLRW be in a form or in a container that will maintain its structural integrity for 300 years [12]. Class C waste must meet the structural integrity requirements for Class B waste and must be disposed of in association with barriers that will protect a person from inadvertently intruding into the waste for 500 years [13].

Table AP-16 lists, by generator, the radioactivity and volume of the three classes of LLRW shipped for disposal. Prior to 1992, all Class B and C waste generated in Connecticut was generated by the four nuclear power plants. In 1992, however, the United Technologies Research Center disposed an assortment of sealed calibration and measurement sources that met the definition of Class C LLRW. In 1993 and 1994, this practice continued with a number of non-nuclear power plant generators disposing Class B and Class C sealed sources. In 1994, the U.S. Navy disposed 135 Curies of Class B waste consisting of 3.7 cubic feet of tritium-containing glow-in-the-dark diving wrist-watches and exit signs. In 1996, the U.S. Army Connecticut National Guard disposed luminescent dials and devices totalling 191 Curies of radioactivity (primarily tritium) in 10.6 cubic feet of Class B and Class C waste.

Table AP-17 shows the proportions, by waste class, for the total activity and volume shipped to disposal in 1996. These proportions of Class A, B, and C LLRW are also illustrated in Figure AP-3.

Table AP-17A and Figure AP-3A show the average proportions, by waste class, for Connecticut waste shipped to disposal during the nine-year period 1987-1996. This is the time interval for which the CHWMS has detailed generator reports on LLRW management.

The volume distribution for 1996 is more heavily weighted to Class B and Class C waste than the average. Generally, Class A waste is approximately 94% of the total volume disposed while Class B and C make up the remaining 6%. In 1996, however, Class A waste contributed only 74.5% of the total volume disposed.

The radioactivity distribution for 1996, departs even farther from the norm. On average, Class C waste contains approximately 95% of the radioactivity, while Classes A and B each contain on the order of 2%. In 1996, Class C waste represented only 28.1% of the radioactivity, while Class A contained 8.9% and Class B contained 63.0%. This deviation from the normal can be explained in part by the absence of Class C nonfuel reactor core components (B-NFRCOMP and P-NFRCOMP) from 1996 waste disposed. These categories of LLRW normally raise total radioactivity far above the 3,087.925 Curies disposed in 1996, thereby suppressing the activity percent of both Class A and Class B waste. In 1996, this type of Class C LLRW was absent, allowing Class A and B wastes to assert themselves in the activity distribution. Moreover, the Class A waste disposed in 1996 was unusually low in activity, thereby allowing Class B waste to further dominate in terms of radioactivity.

9. RADIONUCLIDE CONTENT OF LLRW

9.1 Radionuclide Content of 1996 LLRW

Table AP-18 lists by atomic weight the radionuclides in the LLRW shipped off-site for management[f] by all Connecticut generators in 1996, including the nuclear power plants. For each radionuclide, the table indicates its half-life in years and the radioactivity it contributes to the waste shipped for management by each category of generator. On Tables AP-18A and AP-18B, the same data are listed, in descending order, on the basis of half-life. Table AP-18A presents the radionuclides with half-lives greater than five years, while Table AP-18B shows the radionuclides with half-lives shorter than five years.

Table AP-19 isolates radionuclide data for the nuclear power plants. The table shows the radionuclide content of nuclear power plant LLRW shipped off-site for management in 1996 in terms of Class A, B, and C waste.

The nine highest activity radionuclides, almost entirely contributed by nuclear power plants, are cesium-137 (half-life 30.2 years); zinc-65 (half-life 243.8 days); iron-55 (half-life 2.7 years); cobalt-60 (half-life 5.3 years); cesium-134 (half-life 2.1 years); nickel-63 (half-life 100.0 years); hydrogen-3 (tritium; half-life 12.3 years); manganese-54 (half-life 312.2 days); and cobalt-58 (half-life 70.9 days). Approximately 99.5% of the total radioactivity shipped off-site for management from Connecticut in 1996 was accounted for by these nine radionuclides. Their distribution in Connecticut's LLRW as a percentage of total radioactivity disposed in 1996 is as follows:

Radionuclide	% of Total Curies
Cs-137	23.1
Zn-65	22.3
Fe-55	14.4
Co-60	9.1
Cs-134	8.6
Ni-63	8.0
H-3	6.6
Mn-54	5.3
Co-58	2.1
TOTAL	99.5%

[f]Data gathered for calendar year 1996 contained isotopic composition of LLRW *shipped off-site for management.* This is in contrast to data for prior years which gave the isotopic composition of LLRW actually disposed. Thus, data for 1996 include LLRW that was held over by brokers or processors at the end of 1996 and LLRW that was incinerated or decontaminated. The data exclude waste shipped off-site in previous years and subsequently disposed in 1996.

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Tables AP-20A to AP-20D list the radionuclides in LLRW shipped off-site for management in 1996 which have been identified by the NRC for inclusion in its impacts analysis methodology for the LLRW disposal regulations [14]. For each radionuclide, the tables indicate its concentration in the various waste streams shipped from Connecticut during 1996 for management. For the nuclear power plants, the highest concentrations (in millicuries per cubic foot of waste) are represented by iron-55, cobalt-60, nickel-63, cesium-134, and cesium-137. The highest concentrations occurred in ion exchange resins and filter cartridges.

9.2 Decay of 1996 LLRW

LLRW shipped off-site for management in 1996[g] by Connecticut generators contained many different radionuclides having a wide variety of half-lives. "Half-life" is the length of time it takes for the amount of a particular radionuclide to be reduced, through radioactive decay, to one-half of its initial value. Each radionuclide has a specific, measurable half-life. The majority of the radioactivity was associated with radionuclides having relatively short half-lives (i.e., less than 5.3 years), while some of the radionuclides in the waste have very long half-lives.

Figure AP-4 depicts the effects of radioactive decay on the amount of radioactivity left in Connecticut LLRW shipped off-site for management in 1996 at various points in the future, including the ingrowth and decay of progeny radionuclides. The amount of radioactivity left after 100 years is 269 Curies, approximately 9% of the original 3,107 Curies. After 500 years, the amount remaining is approximately 11 Curies, less than 1% of the original amount.

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[g]See footnote f.

10. TRENDS IN THE AMOUNTS OF LLRW SHIPPED

Table AP-21 and Figures AP-4 and AP-5 illustrate trends in the volume and activity of LLRW shipped for disposal from Connecticut from 1979 to 1996. The volumes and activities for 1979 to 1986 are taken from the Department of Energy's (DOE) "Annual State-by-State Assessments" [15]. Data for 1987 and subsequent years are taken from surveys conducted by the CHWMS and DEP.

There are a number of caveats associated with the DOE reports and data.

- First, for 1979 through 1982, the information on academic and medical LLRW generators is grouped together under a category labeled "institutional." Based on the information provided in the reports and other information that is readily available, it is not possible to determine the volume of waste attributable to either of the two types of generators.

- Second, for 1979 through 1984, no data is provided on the activity of waste generated by industrial, academic, and medical waste generators. Data on the activity of waste generated by government generators is not provided for 1983 and 1984. Based on information readily available, it is not possible to determine the amount of activity attributable to these types of generators for those years.

- Third, at least through 1985 and possibly through 1986, waste shipment data for waste generators who used brokers were attributed to the state in which the broker was located, rather than to the generator's state. A waste broker often collects waste from several generators and consolidates it into a single full-truck shipment. Most industrial, academic, and medical waste generators use brokers. Therefore, since there are no waste brokers located in Connecticut, these categories of generators are likely to be underreported for Connecticut. Based on the information provided in the reports and other information that is readily available, it is not possible to correct the figures for this factor.

- Finally, there is a problem with the sources of data used in compiling the reports by DOE and EG&G Idaho, Inc., which was then DOE's prime contractor for its LLRW Program. The source of data for nuclear power plants is the semi-annual report each nuclear power plant operator must file with the NRC. One of the things an operator must indicate in the report is the volume and types of LLRW generated during the period that require disposal. Note that this is not necessarily the volume of waste shipped for disposal during the period. It is the volume of waste that will, at some time, have to be shipped for disposal. The source of data on the total volume and activity of waste shipped from the state and the volume and activity (when reported) attributable to generators other than nuclear power plants is the records of the disposal facility operators. These records indicate the volume

and activity of the waste received at each facility. The use of these two different sources of data leads to situations (such as the activity figures for 1979 and 1980 and the volume figure for 1980) where the volume and/or activity reported for nuclear power plants is greater than the volume and/or activity reported for the whole state. As with the other difficulties with the DOE data, it is not possible to resolve these discrepancies with readily available sources of data.

Figure AP-5 demonstrates an overall decline in yearly volumes of LLRW shipped for disposal from Connecticut over the eighteen-year period from 1979 to 1996. This trend is attributable to improvements in operating and waste processing technologies, with the greatest volume reduction attributable to nuclear power plants, as well as to requirements and penalties of the federal Low-Level Radioactive Waste Policy Amendments Act of 1985. Deviations from the overall downward trend can be attributed primarily to:

- The scheduled closure to Connecticut generators of the nation's three LLRW disposal facilities operating in 1992, which encouraged generators to ship as much waste as possible prior to December 31, 1992;

- Disposal surcharges, which also encourage generators to ship as much waste as possible prior to a statutory increase; and

- Nuclear power plant outages (temporary shutdowns) and fuel fabrication facility decommissioning, which cause increased volumes of LLRW to be generated on a temporary basis.

The major trend discernible in the amounts of radioactivity (Figure AP-6) is that the large fluctuations in radioactivity shipped appear to be completely dependent on generation of certain high activity LLRW during non-routine actions taken by the nuclear power plant operators. It appears that the only source of these high-activity wastes is the removal or replacement of reactor equipment and components. The large amounts of radioactivity shipped in 1984 and 1985 resulted from the removal and disposal of the thermal shield from Millstone 2. The increase in 1987 was from the in-core instrumentation shipped from Millstone 2, and the increase in 1988 was from the replacement of control rod blades at Millstone 1. Similarly, most of the radioactivity shipped for disposal in 1990 resulted from removal and disposal of the Connecticut Yankee thermal shield. The extraordinarily low radioactivity of LLRW disposed in 1991, 1993, 1994, 1995, and 1996 is attributable to the fact that no Class C reactor core components were disposed. In 1992, disposal of control rod blades from Millstone 1 accounted for most of the activity disposed.

Some of these activities are scheduled further in advance than others. For example, in 1989 officials from Northeast Utilities indicated that significant amounts of Class C waste would continue to be generated at Millstone 1 over the next several years since the number of control rod blades that were to be replaced over that period would be greater than in previous years [16].

In terms of radioactivity shipped for disposal, non-power plant generators held relatively constant during the period 1987 through 1993 at the 10-24 Curie level. 1994 was unusual in that the U.S. Navy disposed 135 Curies of Class B tritium waste at the Barnwell facility, while other non-power plant generators disposed 12 Curies. Similarly, 1996 was unusual in that the U.S. Army Connecticut National Guard disposed 191 Curies of tritium waste at the Barnwell facility, while other non-power plant generators disposed 6 Curies. On the other hand, 1995 was notable for the low activity of LLRW disposed, both by the nuclear power plants and the non-power plant generators.

11. LIQUID SCINTILLATION VIAL WASTE

Table AP-22 reports the radioactivity, by radionuclide, present in liquid scintillation vial (LSV) waste generated in 1987 through 1996. In 1996, LSV waste was generated by the following facilities in Connecticut:

INSTITUTIONAL

University of Connecticut Health Center
Yale University

INDUSTRIAL

United States Surgical Corporation

PRIVATE RESEARCH

Bayer Corporation (Miles Inc.)
Bristol-Myers Squibb
Neurogen Corporation
Pfizer Inc.

Excluding volumes retained by brokers at the end of 1996, all LSV waste shipped off-site went to Perma-Fix in Gainesville, Florida or to NSSI in Houston, Texas for incineration (see Chapter 7) and are removed from the Connecticut waste inventory.

One of the primary concerns with liquid scintillation vial waste is that the liquid component is often an organic solvent. Many organic solvents are flammable (ignitable) liquids under U.S. Department of Transportation hazardous material regulations and U.S. Environmental Protection Agency (EPA) hazardous waste regulations. Therefore, if the organic solvent is one listed by the EPA in its hazardous waste regulations or meets the EPA's criteria for an ignitable waste, the waste is a mixed waste. Many facilities that generate LSV waste have expressed interest in and are currently pursuing ways to substitute environmentally benign solvents for hazardous organic solvents. However, even if no substitutes are found, incineration effectively eliminates LSV waste as LLRW and hazardous waste.

Perma-Fix and NSSI have licenses to process LLRW and permits to treat hazardous waste, which means that they are mixed waste management facilities.

There is no reason to believe that these processing facilities will not remain available to Connecticut generators of LSV waste. Even if, for some unforeseen reason, out-of-state processing for LSV waste is no longer available to Connecticut generators, this waste would probably not be disposed of in a Connecticut facility. It appears that the solvents in LSV waste are subject to the land disposal restrictions for hazardous waste developed by the EPA as required by the federal Hazardous and Solid Waste Amendments of 1984. Under these restrictions, before disposal is permitted, various types of hazardous waste must be treated to meet certain standards. The State is not responsible for making such treatment capacity available to generators. The State would be responsible for providing disposal capacity for the waste after it is treated to reduce or eliminate the non-radiological hazards in the waste.

12. MIXED WASTE

Mixed waste is waste that satisfies the definition of LLRW in the Low-Level Radioactive Waste Policy Amendments Act of 1985 and contains hazardous waste that either: 1) is listed as a hazardous waste by the EPA in Title 40, Code of Federal Regulations, Part 261, Subpart D; or 2) causes the LLRW to exhibit any of the hazardous waste characteristics identified by the EPA in Title 40, Code of Federal Regulations, Part 261, Subpart C. Management of mixed waste is subject to the regulatory requirements of both the NRC and the EPA. While the management of mixed waste does not appear to present any new or extraordinary technical problems, integrating the two regulatory programs into a coherent whole may present some difficulties.

As mentioned in Chapter 2, according to federal law, states are responsible for providing disposal capacity for mixed waste [17]. On March 23, 1989, the Board of Directors of the CHWMS resolved that the capability and capacity to dispose of mixed waste would be included in the plans for a LLRW disposal facility in Connecticut, if Connecticut ultimately must provide disposal capacity for mixed waste.

In 1990 EPA adopted regulations implementing the land disposal restriction (LDR) provision of the 1984 Hazardous and Solid Waste Amendments (HSWA) of the Resource Conservation and Recovery Act. Pursuant to these EPA regulations, the land disposal of untreated mixed waste was prohibited after May 8, 1990, while, under HSWA, generator storage of mixed waste is also prohibited beyond a reasonable period of time to allow for accumulating sufficient waste for a shipment. However, because of a nationwide lack of mixed waste treatment capacity, EPA granted a national capacity variance deferring imposition of treatment requirements until May 8, 1992. Under the variance, generators could legally store mixed waste or dispose of it without treatment in licensed facilities [18]. In view of the fact that no landfills in the country are licensed to accept untreated commercial mixed waste, generators followed the storage option.

On May 8, 1992, the EPA variance expired, and, pursuant to HSWA, the storage of mixed waste became illegal. Because the lack of mixed waste treatment and disposal capacity remained a continuing problem beyond May 8, 1992, however, mixed waste generators had no alternative to storing their waste on-site. Faced with this dilemma, EPA announced a policy identifying illegal on-site mixed waste storage as a reduced priority among its civil enforcement actions until December 31, 1993 [19]. The policy has since been extended twice, first until April 20, 1996 since "there has been little change in the availability of treatment capacity since the Policy was issued in 1991" and, second, until April 20, 1998 [20].

While the U.S. Department of Energy and private industry are making progress in providing mixed waste treatment capacity, the EPA policy is still in effect with regard to mixed wastes for which there are no available treatment or disposal options. However, EPA has warned generators that they must use appropriate new treatment technologies that come on line or face enforcement action.

The EPA enforcement policy applies to mixed waste generators producing less than 1,000 cubic feet of mixed waste per year, provided that they are otherwise managing their mixed waste in an environmentally responsible manner. Given the 1,000 cubic feet per year threshold, the policy potentially applies to all Connecticut mixed waste generators.

Not considering the LSV waste (commonly a mixed waste) discussed in Chapter 11, the following facilities indicated that they generated mixed waste and/or had mixed waste in on-site storage in 1996:

NUCLEAR POWER PLANTS

Connecticut Yankee Atomic Power Co.
Millstone 1 Northeast Nuclear Energy Co.
Millstone 2 Northeast Nuclear Energy Co.
Millstone 3 Northeast Nuclear Energy Co.

MILITARY

U.S. Navy

INSTITUTIONAL

University of Connecticut Environmental Health & Safety
University of Connecticut Health Center
Yale University

PRIVATE RESEARCH

Bayer Corporation (Miles Inc.)
Boehringer Ingelheim Pharmaceuticals
Bristol-Myers Squibb

FUEL FABRICATION

ABB Combustion Engineering Nuclear Products

These facilities reported that they were storing a total of 713.5 cubic feet of mixed waste at the close of 1996. The types of waste being stored include organic solvents, lead and other heavy metals, and spent freon.

The nuclear power plants generate and store the greatest quantities of mixed waste. The primary source of mixed waste at the nuclear power plants was their on-site laundries where protective clothing was cleaned. The laundries used freon as a solvent in the cleaning process and waste containing freon is classified by the EPA as hazardous waste. The nuclear power plants have discontinued dry cleaning. Northeast Utilities reported that it was storing 487.7 cubic feet of mixed waste from the Millstone Point nuclear power plants, primarily spent freon, lead paint chips, acids, and organic solvents at the end of 1996. Connecticut Yankee reported that it was storing 16.7 cubic feet of mixed waste.

13. MAGNESIUM-THORIUM, NICKEL-THORIUM, AND TUNGSTEN-THORIUM ALLOY WASTES

Magnesium-thorium alloy is a metal used in the manufacture of several products for the U.S. Department of Defense. Thorium is a naturally occurring radioactive material that is regulated by the NRC as a source material. Source materials, like naturally occurring uranium and thorium, are the raw materials of nuclear energy. The isotope of thorium present in the alloy (thorium-232) has a very long half-life (14 billion years) and, consequently, has a very low comparative radioactivity per unit of volume. The magnesium-thorium alloy waste is in the form of metal turnings that result from machining the alloy.

Prior to 1991, magnesium-thorium alloy waste from Connecticut facilities was routinely recycled and did not become classified as LLRW. However, metals companies are now reported to be less willing to accept this highly combustible waste stream for recycling.

AlliedSignal Engines shipped 207 cubic feet of magnesium-thorium off-site for management from its Stratford Army Engine Plant during 1996. Fifteen cubic feet of this material were reduced to 5.6 cubic feet and disposed.

Butkin Precision Manufacturing Corp. was a Connecticut company that worked with magnesium-thorium alloy in the past. Although Butkin went out of business during 1994, the former owner of the company is holding 320 cubic feet of debris containing magnesium-thorium waste in secure storage in Milford. The Connecticut DEP has been monitoring the condition and storage of this waste.

Electro-Methods Overhaul & Repair, a South Windsor firm, was storing 36.8 cubic feet of magnesium-thorium at the end of 1996.

Another thoriated metal alloy waste generated in Connecticut is nickel-thorium. This alloy is a strong, heat resistant metal used in the manufacture of aircraft engine parts. Waste metal from this process is returned periodically to a supplier. At the end of 1996, Pratt & Whitney (based in East Hartford) was storing 300 cubic feet of waste nickel-thorium. Electro-Methods, Inc., a South Windsor affiliate of Electro-Methods Overhaul & Repair, was storing 9.7 cubic feet of nickel-thorium at the end of 1996.

Aerospace Metals, Inc. is a Hartford scrap metal processor which does not actually generate LLRW. It does, however, occasionally come into possession of thoriated metal in loads of scrap, despite efforts to screen out such material. Aerospace Metals stores, and ultimately disposes, scrap thoriated metals it cannot return to the actual generator. At the end of 1996, Aerospace Metals was storing approximately 17 cubic feet of scrap thoriated metal.

14. LLRW PROJECTIONS

An additional subject that the CHWMS is required to address pursuant to the Connecticut LLRW disposal facility siting statute is:

> projections of the volumes, types and half life of the low-level radioactive wastes which are expected to be generated . . . during the next twenty years . . . . (CGS 22a-163b(3))

In the 1988 LLRW Management Plan, the CHWMS established a planned operating life for a LLRW disposal facility in Connecticut of 50 years. This period of time would cover the planned decommissioning and dismantling of the four nuclear power plants in Connecticut. Having established a planned operating life, the CHWMS developed LLRW projections for the 50 years of operation of the disposal facility in addition to 20-year projections as required in state law. The projections in the 1988 Management Plan focused on volume.

The CHWMS revised its LLRW projections in the 1990 update of the Management Plan. Again, projections were prepared for 20 years and 50 years and they focused on the volume of LLRW that would be generated.

In November, 1991, former Governor Weicker directed the Commissioner of Public Health to review the impact that a LLRW disposal facility would have on people. In response, Susan Addiss, then Commissioner of Public Health, requested that the CHWMS direct its contractor, Rogers and Associates Engineering Corporation (RAE), to prepare a performance appraisal for review by the Department of Public Health (DPH) and its independent contractor. The performance appraisal was conducted with limited information on waste form, disposal technology and disposal site characteristics. Therefore, the performance appraisal can only be considered a qualitative measure of the potential for a site to protect public health and safety.

As part of the performance appraisal, RAE developed an inventory of the radionuclide composition of the LLRW that would be disposed of in a LLRW disposal facility in Connecticut over the 50-year operating life. The performance appraisal yielded results similar to those of previous studies undertaken by the NRC, its contractors, and other states in climates similar to Connecticut's. Commissioner Addiss, in a cover letter to the performance appraisal [21], offered the following:

> Based upon information developed in the Performance Appraisal, staff analysis of available data, and assessments by other outside experts, I conclude that a low-level radioactive waste facility can be safely sited in Connecticut if the recommendations in the attached report are carefully followed and if the parameters in the report are as projected.

Commissioner Addiss identified five factors as critical to the safety of a facility in Connecticut. The pertinent one for this discussion is the first, concerning the amount and

type of radioactivity to be placed in the facility, particularly the amount of certain long-lived, mobile radionuclides. She characterized this factor as follows:

> The most important factor to be considered is the amount and type of radioactivity to be placed in the site. The Performance Appraisal identified a data gap with respect to this item. With the cooperation of Northeast Utilities, better estimates are now available. Substantial uncertainty still remains; nevertheless, as new information from a variety of sources becomes available, the uncertainty in the predictions will be reduced. The type of radioisotopes and the materials in which they are bound need to be fully understood. This information allows accurate estimates of risk from different exposure pathways. These factors are as critical as the geology in determining the potential for health impact. A few long-lived isotopes, those with radioactive half lives of thousands of years, are at the center of the problem in a determination of risk. Because these isotopes may be soluble in water, it must be assumed that they will eventually be present in the ground water and could lead to human exposure. This is the determining factor with respect to the maximum amount of radioactivity placed in the site. It will not be possible to sufficiently reduce this pathway by considerations of soil permeability and depth to ground water at the [500] year time point. This means that reduction of the potential for certain radioisotopes in certain forms must be considered.

The CHWMS retained RAE to assist it in preparing the LLRW projections for the 1993 LLRW Management Plan. RAE has prepared volume projections and projections of the radionuclide inventory that will be generated over the next 20 years and during the 50-year planned operating life of a LLRW disposal facility in Connecticut. Table AP-23 summarizes the 50-year projections.[h]

While the work undertaken by RAE for the projections included refining the projections of the radionuclide inventory prepared for the Performance Appraisal, special emphasis was placed on reducing the uncertainty in the projections of the specific long-lived, mobile radionuclides Commissioner Addiss referenced. Most of these radionuclides come from the four nuclear power plants.

There are three primary components to LLRW projections:

1. The amount of waste that will be generated by the four nuclear power plants during the remainder of their operating lives;

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[h]These projections were assembled in September, 1994, well before the December, 1996 announcement by Northeast Utilities that the Connecticut Yankee nuclear power plant would be taken out of service and decommissioned. Early shutdown and decommissioning of Connecticut Yankee will significantly reduce the volume and activity to be disposed in Connecticut's LLRW disposal facility. However, new projections taking these developments into account have not yet been compiled.

2. The amount of waste that will be generated by other LLRW generators over the 20-year and 50-year time periods under consideration; and

3. The amount of waste that will be generated during the decommissioning of the four nuclear power plants.

Just before RAE prepared the projections report, Northeast Utilities, operator of the four nuclear power plants in Connecticut, revised its plans and studies for decommissioning the plants. The revised data were incorporated into the projections. Based on this data, approximately 65% of the volume of the LLRW that would have been generated and disposed during the 50-year operating life of Connecticut's LLRW disposal facility (had the Connecticut Yankee plant remained in service) would have come from the decommissioning of the four nuclear power plants. As noted above, the early closure and decommissioning of Connecticut Yankee will alter these figures significantly.

The projections report was approved by the CHWMS Board of Directors on September 7, 1994 and by the General Assembly on April 2, 1995.

Endnotes

1. Connecticut General Statutes, Section 22a-163 et seq.

2. CGS Section 22a-163b.

3. The Low-Level Radioactive Waste Policy Act of 1980 (Public Law 96-573) and the Low-Level Radioactive Waste Policy Amendments Act of 1985 (Public Law 99-240).

4. CGS Section 22a-165d.

5. The Low-Level Radioactive Waste Policy Act of 1980 (Public Law 96-573, Section 3) and The Low-Level Radioactive Waste Policy Amendments Act of 1985 (Public Law 99-240, Section 4).

6. Nuclear Regulatory Commission, NUREG/CR-4370, "Update of Part 61 Impacts Analysis Methodology" (January, 1986).

7. Substantial portions of the descriptions of categories of LLRW generators are taken from the "Regional Management Plan" (April, 1988) prepared for the Northeast Interstate LLRW Commission by Roy F. Weston, Inc. and Catherine C. Stanton & Associates, Inc.

8. Portions of the description of LLRW types and streams are taken from the "Regional Management Plan" (April, 1988) prepared for the Northeast Interstate LLRW Commission by Roy F. Weston, Inc. and Catherine C. Stanton & Associates, Inc.

9. Title 10 Code of Federal Regulations, Part 61.56(a)(3).

10. 10 CFR 61.55.

11. 10 CFR 61.55; 10 CFR 61.59.

12. 10 CFR 61.7(b).

13. 10 CFR 61.7(b); 10 CFR 61.52(a)(2).

14. NRC, NUREG/CR-4370 (January, 1986).

15. National LLRW Management Program, "State-by-State Assessment of Low-Level Radioactive Wastes Shipped to Commercial Disposal Sites" (Annually).

16. Connecticut Hazardous Waste Management Service, "1989 Update of the Connecticut Low-Level Radioactive Waste Management Plan," March, 1990, p. 43.

17. The Low-Level Radioactive Waste Policy Act of 1980 (Public Law 96-573, Section 3) and The Low-Level Radioactive Waste Policy Amendments Act of 1985 (Public Law 99-240, Section 4).

18. U.S. Environmental Protection Agency, 1990, "Guidance, Resource Conservation and Recovery Act Land Disposal Restrictions, Effects on Storage and Disposal of Commercial Mixed Waste."

19. U.S. Environmental Protection Agency, "Policy on Enforcement of RCRA Section 3004(j) Storage Prohibition at Facilities Generating Mixed Radioactive/Hazardous Wastes," 56 Fed. Reg. 42730 (August 29, 1991).

20. U.S. Environmental Protection Agency, "Extension of the Policy on Enforcement of RCRA Section 3004(j) Storage Prohibition at Facilities Generating Mixed Radioactive/Hazardous Waste," 59 Fed. Reg. 18813 (April 20, 1994) and 61 Fed. Reg. 18588 (April 26, 1996).

21. "Performance Appraisal of a Low-Level Radioactive Waste Disposal Facility at Candidate Sites in Ellington, South Windsor, and East Windsor, Connecticut," (May, 1992) prepared for the Connecticut Hazardous Waste Management Service by Rogers & Associates Engineering Corporation.

TABLES AND FIGURES FOR APPENDIX A

TABLE AP-1: CONNECTICUT GENERATORS THAT SHIPPED LLRW IN 1996 OR THAT PLAN TO SHIP LLRW FOR MANAGEMENT - BY TOWN AND CATEGORY OF GENERATOR

GENERATOR	TOWN	CATEGORY OF GENERATOR
ABB Combustion Engineering Nuclear Products	Windsor	Fuel Fabrication
ABB Combustion Engineering Nuclear Services	Windsor	Industrial
Advanced Technology Materials, Inc.	Danbury	Industrial
Aerospace Metals, Inc.	Hartford	Industrial
Alexion Pharmaceuticals	New Haven	Private Research
Allegheny Ludlum Steel Corp.	Wallingford	Industrial
AlliedSignal Engines (Textron Lycoming)	Stratford	Industrial
Alpha Q, Inc.	Colchester	Industrial
Bayer Corporation (Miles Inc.)	West Haven	Private Research
Boehringer Ingelheim Pharmaceuticals	Ridgefield	Private Research
Brass Center, Ltd.	Waterbury	Industrial
Bridgeport Hospital	Bridgeport	Institutional
Bristol-Myers Squibb	Wallingford	Private Research
Butkin Precision Manufacturing Corp.	Milford	Industrial
CT Agricultural Experiment Station	New Haven	Institutional
CT Yankee Atomic Power Co.	Haddam	Nuclear Power Plant
Charlotte Hungerford Hospital	Torrington	Institutional
Ciba-Geigy (ICI Americas)	Farmington	Private Research
Clairol	Stamford	Private Research
Connecticut College	New London	Institutional
Connecticut Resources Recovery Authority	Hartford	Institutional
Cuno Inc.	Meriden	Private Research
Cytec Industries Inc.	Stamford	Private Research
DeKalb Genetics Corp.	Stonington	Private Research
Diagnostic Radiology Associates	Waterbury	Institutional
Eastern CT State University	Windham	Institutional
Electro-Methods Overhaul & Repair	South Windsor	Industrial
Electro-Methods, Inc.	South Windsor	Industrial
Fairfield University	Fairfield	Institutional
Fischer Technology Inc.	Windsor	Industrial
Genaissance Pharmaceuticals, Inc.	New Haven	Private Research
General Dynamics, Electric Boat Div.	Groton	Military
Hamilton Chemical	New Haven	Industrial
Hartford Hospital	Hartford	Institutional
Hopkins School	New Haven	Institutional

TABLE AP-1 (continued)

GENERATOR	TOWN	CATEGORY OF GENERATOR
Hughes Danbury Optical Systems	Danbury	Industrial
International Fuel Cells, Inc.	South Windsor	Industrial
John B. Pierce Laboratory	New Haven	Private Research
Kodak S.I.S. (International Biotechnologies)	New Haven	Industrial
Middlesex Hospital	Middletown	Institutional
Millstone 1 Northeast Nuclear Power Co.	Waterford	Nuclear Power Plant
Millstone 2 Northeast Nuclear Power Co.	Waterford	Nuclear Power Plant
Millstone 3 Northeast Nuclear Power Co.	Waterford	Nuclear Power Plant
Neurogen Corporation	Branford	Private Research
Olin Research	Cheshire	Private Research
Packard BioScience Company (Canberra Industries)	Meriden	Industrial
Pfizer Inc.	Groton	Private Research
Protein Sciences Corporation (MicroGene System Inc.)	Meriden	Industrial
RSA Laboratories, Inc.	Hebron	Industrial
S.V.G. Lithography Systems, Inc.	Wilton	Industrial
Schlumberger-Doll Research	Ridgefield	Private Research
Seymour High School	Seymour	Institutional
Stamford Public Schools	Stamford	Institutional
Stanley Works (Laboratory)	New Britain	Industrial
Trinity College	Hartford	Institutional
U.S. Army Connecticut National Guard	Windsor Locks	Military
U.S. Navy	Groton	Military
Uniroyal Chemical Co.	Middlebury	Private Research
United States Surgical Corporation	North Haven	Industrial
United Technologies Research Center	East Hartford	Industrial
United Technologies, Hamilton Standard Div.	Windsor Locks	Industrial
United Technologies, Pratt & Whitney Div.	East Hartford	Industrial
Univ. of CT Environ. Health & Safety	Mansfield	Institutional
University of CT Health Center	Farmington	Institutional
VA Connecticut Healthcare System (V.A. Med. Ctr. Hosp.)	West Haven	Institutional
Wesleyan University	Middletown	Institutional
Windham Community Memorial Hospital	Windham	Institutional
Yale University	New Haven	Institutional
Yale-New Haven Hospital	New Haven	Institutional

TABLE AP-2: CONNECTICUT GENERATORS THAT HELD LLRW ON-SITE FOR STORAGE OR SHIPPED LLRW OFF-SITE FOR MANAGEMENT AND TO DISPOSAL FACILITIES IN 1996

GENERATOR	CATEGORY OF GENERATOR *	LLRW HELD IN ON-SITE STORAGE		LLRW SHIPPED OFF-SITE FOR MANAGEMENT		LLRW SHIPPED TO DISPOSAL FACILITIES	
		VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)
ABB Combustion Engineering Nuclear Products	FF	1,578.5	0.032	903.8	0.037	900.0	0.037
ABB Combustion Engineering Nuclear Services	ID	1,150.0	0.100	7,797.5	0.757	12.0	0.196
Advanced Technology Materials, Inc.	ID	0.0	0.000	0.4	<0.001	0.2	<0.001
Aerospace Metals, Inc.	ID	17.0	0.005	0.0	0.000	0.0	0.000
Alexion Pharmaceuticals	PR	43.6	0.042	0.0	0.000	0.0	0.000
Allegheny Ludlum Steel Corp.	ID	0.0	0.000	0.4	<0.001	0.4	<0.001
AlliedSignal Engines (Textron Lycoming)	ID	0.0	0.000	207.0	0.005	5.6	<0.001
Bayer Corporation (Miles Inc.)	PR	7.5	<0.001	811.7	0.248	167.8	0.255
Boehringer Ingelheim Pharmaceuticals	PR	57.0	0.052	42.3	0.518	63.9	1.036
Brass Center, Ltd.	ID	0.0	0.000	0.2	<0.001	0.2	<0.001
Bridgeport Hospital	IT	0.0	0.000	7.5	0.023	1.2	0.023
Bristol-Myers Squibb	PR	0.0	0.000	294.0	0.482	1.4	0.177
Butkin Precision Manufacturing Corp.	ID	320.0	0.001	0.0	0.000	0.0	0.000
CT Agricultural Experiment Station	IT	12.6	0.001	0.0	0.000	0.0	0.000
CT Yankee Atomic Power Co.	NPP	2,193.8	1.000	14,823.6	1,252.541	1,557.1	1,196.031
Charlotte Hungerford Hospital	IT	0.0	0.000	0.7	0.001	0.0	0.000
Ciba-Geigy (ICI Americas)	PR	0.0	0.000	134.8	0.001	9.2	0.001
Connecticut College	IT	1.0	0.001	0.0	0.000	0.0	0.000
Connecticut Resources Recovery Authority	IT	0.0	0.000	4.7	<0.001	4.1	<0.001
Cuno Inc.	PR	7.5	0.001	7.5	0.001	0.0	0.000
Cytec Industries Inc.	PR	0.0	0.000	<0.1	<0.001	<0.1	<0.001
DeKalb Genetics Corp.	PR	10.7	<0.001	0.0	0.000	0.0	0.000
Eastern CT State University	IT	5.6	<0.001	1.4	<0.001	1.4	<0.001
Electro-Methods Overhaul & Repair	ID	36.8	<0.001	0.0	0.000	0.0	0.000
Electro-Methods, Inc.	ID	9.7	<0.001	0.0	0.000	0.0	0.000
Fairfield University	IT	6.5	0.001	0.0	0.000	0.0	0.000
Fischer Technology Inc.	ID	<0.1	0.068	0.0	0.000	0.0	0.000
Genaissance Pharmaceuticals, Inc.	PR	0.2	0.005	0.0	0.000	0.0	0.000
Hamilton Chemical	ID	0.0	0.000	0.4	<0.001	0.4	<0.001
Hartford Hospital	IT	7.0	0.001	0.0	0.000	0.0	0.000
Hopkins School	IT	0.0	0.000	0.1	<0.001	0.1	<0.001
Hughes Danbury Optical Systems	ID	10.0	<0.001	43.8	<0.001	18.3	<0.001
John B. Pierce Laboratory	PR	20.3	0.001	0.0	0.000	0.0	0.000
Kodak S.I.S. (International Biotechnologies)	ID	7.5	<0.001	0.0	0.000	0.0	0.000
Middlesex Hospital	IT	22.0	0.010	0.0	0.000	0.0	0.000
Millstone 1 Northeast Nuclear Power Co.	NPP	637.6	52,800.000 **	21,178.9	1,080.916	4,264.8	1,096.556
Millstone 2 Northeast Nuclear Power Co.	NPP	133.0	33.900	7,028.0	75.987	1,366.2	73.172
Millstone 3 Northeast Nuclear Power Co.	NPP	190.8	75.200	4,164.2	499.312	2,101.9	525.599

TABLE AP-2 (continued)

GENERATOR	CATEGORY OF GENERATOR	LLRW HELD IN ON-SITE STORAGE		LLRW SHIPPED OFF-SITE FOR MANAGEMENT		LLRW SHIPPED TO DISPOSAL FACILITIES	
		VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)
Neurogen Corporation	PR	46.0	0.009	133.0	0.013	23.0	0.010
Olin Research	PR	2.6	<0.001	0.0	0.000	0.0	0.000
Pfizer Inc.	PR	206.3	0.086	1,768.2	2.057	34.0	1.453
Protein Sciences Corporation (MicroGene System Inc.)	ID	4.1	0.020	0.0	0.000	0.0	0.000
RSA Laboratories, Inc.	ID	1.0	<0.001	0.0	0.000	0.0	0.000
S.V.G. Lithography Systems	ID	1.2	<0.001	0.0	0.000	0.0	0.000
Schlumberger-Doll Research	PR	0.5	<0.001	0.0	0.000	0.0	0.000
Seymour High School	IT	0.0	0.000	1.1	<0.001	0.0	0.000
Stamford Public Schools	IT	0.0	0.000	0.2	<0.001	0.2	<0.001
Stanley Works (Laboratory)	ID	0.0	0.000	0.4	<0.001	0.4	<0.001
Trinity College	IT	13.0	0.001	0.0	0.000	0.0	0.000
U.S. Army Connecticut National Guard	M	0.0	0.000	13.1	191.014	13.1	191.014
U.S. Navy	M	142.0	<0.001	997.5	2.002	997.5	2.002
Uniroyal Chemical Co.	PR	69.6	0.033	74.5	0.018	4.1	0.003
United States Surgical Corporation	ID	4.0	<0.001	15.0	0.014	1.4	0.014
United Technologies Research Center	ID	6.1	0.003	7.4	<0.001	0.0	0.000
United Technologies, Hamilton Standard Div.	ID	3.5	0.075	0.0	0.000	0.0	0.000
United Technologies, Pratt & Whitney Div.	ID	300.0	0.020	0.0	0.000	0.0	0.000
Univ. of CT Environ. Health & Safety	IT	0.0	0.000	79.0	0.123	35.2	0.049
University of CT Health Center	IT	245.0	0.222	150.0	0.050	92.5	0.110
VA Connecticut Healthcare System (V.A. Med. Ctr. Hosp.)	IT	0.0	0.000	15.0	<0.001	0.0	0.000
Wesleyan University	IT	0.0	0.000	15.0	0.001	5.3	0.001
Windham Community Memorial Hospital	IT	0.0	0.000	3.0	0.001	0.0	0.000
Yale University	IT	213.9	0.600	1,075.9	0.402	46.1	0.181
Yale-New Haven Hospital	IT	0.0	0.000	0.0	0.000	40.9	0.005
		7,745.0	52,911.490	61,801.2	3,106.525	11,769.9	3,087.925

* Note: Generator Categories Are Abbreviated as Follows on This and Subsequent Tables and Figures
ID- Industrial PR- Private Research IT- Institutional NPP- Nuclear Power Plant M- Military FF- Fuel Fabrication

** 36,000 Curies of this radioactivity were contained in 330 cubic feet of Class C control rod blades.

TABLE AP-3A: CONNECTICUT LLRW SHIPPED TO DISPOSAL FACILITIES IN 1996 - BY GENERATOR

RANKED BY RADIOACTIVITY

GENERATOR	VOLUME (cu ft)	RADIOACTIVITY (Curies)
CT Yankee Atomic Power Co.	1,557.1	1,196.031
Millstone 1 Northeast Nuclear Power Co.	4,264.8	1,096.556
Millstone 3 Northeast Nuclear Power Co.	2,101.9	525.599
U.S. Army Connecticut National Guard	13.1	191.014
Millstone 2 Northeast Nuclear Power Co.	1,366.2	73.172
U.S. Navy	997.5	2.002
Pfizer Inc.	34.0	1.453
Boehringer Ingelheim Pharmaceuticals	63.9	1.036
Bayer Corporation (Miles Inc.)	167.8	0.255
ABB Combustion Engineering Nuclear Services	12.0	0.196
Yale University	46.1	0.181
Bristol-Myers Squibb	1.4	0.177
University of CT Health Center	92.5	0.110
Univ. of CT Environ. Health & Safety	35.2	0.049
ABB Combustion Engineering Nuclear Products	900.0	0.037
Bridgeport Hospital	1.2	0.023
United States Surgical Corporation	1.4	0.014
Neurogen Corporation	23.0	0.010
Yale-New Haven Hospital	40.9	0.005
Uniroyal Chemical Co.	4.1	0.003
Ciba-Geigy (ICI Americas)	9.2	0.001
Wesleyan University	5.3	0.001
Hughes Danbury Optical Systems	18.3	<0.001
AlliedSignal Engines (Textron Lycoming)	5.6	<0.001
Connecticut Resources Recovery Authority	4.1	<0.001
Eastern CT State University	1.4	<0.001
Allegheny Ludlum Steel Corp.	0.4	<0.001
Hamilton Chemical	0.4	<0.001
Stanley Works (Laboratory)	0.4	<0.001
Advanced Technology Materials, Inc.	0.2	<0.001
Brass Center, Ltd.	0.2	<0.001
Stamford Public Schools	0.2	<0.001
Hopkins School	0.1	<0.001
Cytec Industries Inc.	<0.1	<0.001
TOTALS	**11,769.9**	**3,087.925**

TABLE AP-3B: CONNECTICUT LLRW SHIPPED TO DISPOSAL FACILITIES IN 1996- BY GENERATOR

RANKED BY VOLUME

GENERATOR	VOLUME (cu ft)	RADIOACTIVITY (Curies)
Millstone 1 Northeast Nuclear Power Co.	4,264.8	1,096.556
Millstone 3 Northeast Nuclear Power Co.	2,101.9	525.599
CT Yankee Atomic Power Co.	1,557.1	1,196.031
Millstone 2 Northeast Nuclear Power Co.	1,366.2	73.172
U.S. Navy	997.5	2.002
ABB Combustion Engineering Nuclear Products	900.0	0.037
Bayer Corporation (Miles Inc.)	167.8	0.255
University of CT Health Center	92.5	0.110
Boehringer Ingelheim Pharmaceuticals	63.9	1.036
Yale University	46.1	0.181
Yale-New Haven Hospital	40.9	0.005
Univ. of CT Environ. Health & Safety	35.2	0.049
Pfizer Inc.	34.0	1.453
Neurogen Corporation	23.0	0.010
Hughes Danbury Optical Systems	18.3	<0.001
U.S. Army Connecticut National Guard	13.1	191.014
ABB Combustion Engineering Nuclear Services	12.0	0.196
Ciba-Geigy (ICI Americas)	9.2	0.001
AlliedSignal Engines (Textron Lycoming)	5.6	<0.001
Wesleyan University	5.3	0.001
Uniroyal Chemical Co.	4.1	0.003
Connecticut Resources Recovery Authority	4.1	<0.001
Bristol-Myers Squibb	1.4	0.177
United States Surgical Corporation	1.4	0.014
Eastern CT State University	1.4	<0.001
Bridgeport Hospital	1.2	0.023
Allegheny Ludlum Steel Corp.	0.4	<0.001
Hamilton Chemical	0.4	<0.001
Stanley Works (Laboratory)	0.4	<0.001
Advanced Technology Materials, Inc.	0.2	<0.001
Brass Center, Ltd.	0.2	<0.001
Stamford Public Schools	0.2	<0.001
Hopkins School	0.1	<0.001
Cytec Industries Inc.	<0.1	<0.001
TOTALS	**11,769.9**	**3,087.925**

TABLE AP-4A: LLRW SHIPPED TO FULL-SERVICE DISPOSAL FACILITIES IN 1996 BY THE 50 STATES AND THE DISTRICT OF COLUMBIA *

RANKED BY VOLUME

STATE	VOLUME (cu ft)	RADIOACTIVITY (Curies)
Oregon	52,127	357
Illinois	51,989	57,328
Tennessee	44,864	649
Washington	34,614	636
Michigan	24,951	41,907
Pennsylvania	24,185	71,905
Virginia	17,667	10,375
California	17,154	3,502
New York	16,245	1,312
New Jersey	15,805	907
Georgia	13,406	122,520
Massachusetts	12,483	16,629
CONNECTICUT **(11,770)	10,870	3,088
South Carolina	10,846	2,348
Arizona	9,329	16
Alabama	9,275	22,281
Mississippi	8,548	2,818
Ohio	7,372	50,021
Florida	6,491	1,418
Louisiana	5,571	799
Texas	5,321	3,942
Nebraska	5,013	32,751
Utah	4,936	<1
Colorado	4,853	77
Minnesota	4,070	1,406
Iowa	3,643	552
Maine	3,499	477
Maryland	3,391	349
Oklahoma	3,254	<1
Missouri	2,943	150
Wisconsin	2,397	153
Hawaii	1,572	1
Kentucky	1,259	462
Kansas	1,185	3,996
Arkansas	571	303
Vermont	563	46
Indiana	337	10
District of Columbia	165	<1
Alaska	145	603
Delaware	127	6
Nevada	118	2
New Mexico	102	4
Rhode Island	91	<1
Montana	82	<1
West Virginia	35	<1
North Dakota	4	<1
New Hampshire	2	<1
Wyoming	<1	13
Idaho	0	0
South Dakota	0	0
North Carolina	0	0
TOTALS	**443,470**	**456,119**

* Source of Data: Except for Connecticut, the volume and radioactivity data were obtained from the U.S. Department of Energy Manifest Information Management System.

** For Connecticut, the volumes in parentheses include 900 cubic feet of high-volume, low-activity LLRW disposed by ABB Combustion Engineering Nuclear Products at Envirocare's LLRW disposal facility at Clive, Utah. LLRW disposed at the Envirocare facility is not reported in the D.O.E. Manifest Information Management System.

TABLE AP-4B: LLRW SHIPPED TO FULL-SERVICE DISPOSAL FACILITIES IN 1996 BY THE 50 STATES AND THE DISTRICT OF COLUMBIA *

RANKED BY RADIOACTIVITY

STATE	VOLUME (cu ft)	RADIOACTIVITY (Curies)
Georgia	13,406	122,520
Pennsylvania	24,185	71,905
Illinois	51,989	57,328
Ohio	7,372	50,021
Michigan	24,951	41,907
Nebraska	5,013	32,751
Alabama	9,275	22,281
Massachusetts	12,483	16,629
Virginia	17,667	10,375
Kansas	1,185	3,996
Texas	5,321	3,942
California	17,154	3,502
CONNECTICUT	**(11,770) 10,870	3,088
Mississippi	8,548	2,818
South Carolina	10,846	2,348
Florida	6,491	1,418
Minnesota	4,070	1,406
New York	16,245	1,312
New Jersey	15,805	907
Louisiana	5,571	799
Tennessee	44,864	649
Washington	34,614	636
Alaska	145	603
Iowa	3,643	552
Maine	3,499	477
Kentucky	1,259	462
Oregon	52,127	357
Maryland	3,391	349
Arkansas	571	303
Wisconsin	2,397	153
Missouri	2,943	150
Colorado	4,853	77
Vermont	563	46
Arizona	9,329	16
Wyoming	<1	13
Indiana	337	10
Delaware	127	6
New Mexico	102	4
Nevada	118	2
Hawaii	1,572	1
Utah	4,936	<1
Oklahoma	3,254	<1
District of Columbia	165	<1
Rhode Island	91	<1
Montana	82	<1
West Virginia	35	<1
North Dakota	4	<1
New Hampshire	2	<1
Idaho	0	0
North Carolina	0	0
South Dakota	0	0
TOTALS	443,470	456,119

* Source of Data: Except for Connecticut, the volume and radioactivity data were obtained from the U.S. Department of Energy Manifest Information Management System.

** For Connecticut, the volumes in parentheses include 900 cubic feet of high-volume, low-activity LLRW disposed by ABB Combustion Engineering Nuclear Products at Envirocare's LLRW disposal facility at Clive, Utah. LLRW disposed at the Envirocare facility is not reported in the D.O.E. Manifest Information Management System.

TABLE AP-5A: CONNECTICUT LLRW SHIPPED OFF-SITE FOR MANAGEMENT IN 1987 THROUGH 1990 - BY GENERATOR

GENERATOR	CATEGORY OF GENERATOR	1987 LLRW SHIPPED OFF-SITE FOR MANAGEMENT		1988 LLRW SHIPPED OFF-SITE FOR MANAGEMENT		1989 LLRW SHIPPED OFF-SITE FOR MANAGEMENT		1990 LLRW SHIPPED OFF-SITE FOR MANAGEMENT	
		VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)
ABB Combustion Engineering Nuclear Products	FF	2,450.0	0.058	3,429.0	0.154	5,007.7	0.176	4,598.0	0.134
ABB Combustion Engineering Nuclear Services	ID	2,182.0	0.186	1,572.0	0.060	1,253.0	0.793	3,804.0	3.613
Advanced Technology Materials, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Aerospace Metals, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Aetna Casualty & Surety	ID	0.0	0.000	0.7	<0.001	0.0	0.000	0.0	0.000
Aircraft Components Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Alexion Pharmaceuticals	PR	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Allegheny Ludlum Steel Corp.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
AlliedSignal Engines (Textron Lycoming)	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Alpha Q, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Bayer Corporation (Miles Inc.)	PR	0.0	0.000	43.5	0.005	274.5	0.103	351.1	0.119
Bob's Stores, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Boehringer Ingelheim Pharmaceuticals	PR	479.0	0.114	390.0	0.475	382.5	0.119	540.0	7.929
Brass Center, Ltd.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Bridgeport Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Bridgeport Metal Goods	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Bristol-Myers Squibb	PR	652.1	0.572	1,135.0	1.441	1,298.7	0.792	1,462.0	1.170
Buck Scientific Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
CT Agricultural Experiment Station	IT	15.0	0.001	0.0	0.000	7.5	<0.001	0.0	0.000
CT Yankee Atomic Power Co.	NPP	15,686.1	544.380	12,563.0	337.951	8,330.4	654.180	13,027.0	220,840.630
Central CT State University	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Charlotte Hungerford Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Chesebrough-Pond's USA Co.	PR	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Ciba-Geigy (ICI Americas)	PR	343.7	0.049	220.1	0.058	715.4	0.330	294.1	0.083
Clairol	PR	4.7	0.014	4.6	0.004	0.0	0.000	0.0	0.000
Connecticut College	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Connecticut Resources Recovery Authority	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Cuno Inc.	PR	0.0	0.000	8.0	0.001	19.4	<0.001	18.7	0.002
Cytec Industries Inc.	PR	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
DeKalb Genetics Corp.	PR	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Dianon Systems Inc.	IT	0.0	0.000	0.0	0.000	9.0	0.006	99.0	0.007
Eastern CT State University	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Electro-Methods, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Fairfield University	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Fischer Technology Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
General Dynamics, Electric Boat Div.	M	0.0	0.000	397.5	0.001	0.0	0.000	0.0	0.000
Groton Board of Education	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Hamilton Chemical	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Hartford Hospital	IT	45.7	0.009	27.0	0.006	26.6	0.006	0.0	0.000
Hopkins School	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Hughes Danbury Optical Systems	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
International Fuel Cells, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
John B. Pierce Laboratory	PR	0.0	0.000	0.0	0.000	84.0	<0.001	0.0	0.000
Kodak S.I.S. (International Biotechnologies)	ID	0.0	0.000	52.5	0.010	15.0	0.010	0.0	0.000
Middlesex Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	7.5	0.220

TABLE AP-5A (continued)

GENERATOR	CATEGORY OF GENERATOR	1987 LLRW SHIPPED OFF-SITE FOR MANAGEMENT		1988 LLRW SHIPPED OFF-SITE FOR MANAGEMENT		1989 LLRW SHIPPED OFF-SITE FOR MANAGEMENT		1990 LLRW SHIPPED OFF-SITE FOR MANAGEMENT	
		VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)
Millstone 1 Northeast Nuclear Power Co.	NPP	24,366.0	505.168	10,808.0	95,518.766	24,805.6	19,915.977	14,421.8	34,111.625
Millstone 2 Northeast Nuclear Power Co.	NPP	4,844.4	22,764.019	9,191.1	50.539	11,423.6	554.266	16,680.7	10.295
Millstone 3 Northeast Nuclear Power Co.	NPP	3,516.0	59.131	6,106.0	533.367	6,102.4	737.682	3,294.0	176.335
Neurogen Corporation	PR	0.0	0.000	0.0	0.000	0.0	0.000	22.5	<0.001
New Britain General Hospital	IT	0.0	0.000	0.0	0.000	7.5	0.295	0.0	0.000
Northrop Grumman Norden Systems (UTC/Westinghouse)	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Norwalk Hospital	IT	184.0	0.003	241.0	0.240	157.0	0.041	72.0	0.010
Novo Nordisk Bioindustrials (Novo Labs)	ID	8.0	0.005	0.0	0.000	0.0	0.000	0.0	0.000
Nuclear Scanning Associates	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Olin Research	PR	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Packard BioScience Company (Canberra Industries)	ID	0.0	0.000	0.0	0.000	0.7	0.009	0.0	0.000
Pfizer Inc.	PR	585.0	8.286	502.5	0.340	465.0	12.241	1,290.0	3.552
Pitney Bowes	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Protein Sciences Corporation (MicroGene System Inc.)	ID	4.0	0.013	0.0	0.000	0.0	0.000	0.0	0.000
Quinnipiac College	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
RSA Laboratories, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Roche Biomedical Laboratories (CYTO-Roche)	PR	44.0	0.001	30.0	0.001	60.0	0.007	60.0	0.007
Rust Utilities Services Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Schlumberger-Doll Research	PR	22.5	<0.001	0.0	0.000	0.0	0.000	0.0	0.000
Seymour High School	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Southern CT State University	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
St. Francis Hospital (St. Francis & Mt. Sinai Campuses)	IT	0.0	0.000	0.0	0.000	90.0	<0.001	75.0	0.001
Stamford Public Schools	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Stanley Works (Laboratory)	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
State of CT, Office of Emergency Management	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Trinity College	IT	0.0	0.000	0.0	0.000	24.5	<0.001	12.3	<0.001
U.S. Army Connecticut National Guard	M	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
U.S. Coast Guard Academy	IT	0.0	0.000	4.0	0.001	0.0	0.000	0.0	0.000
U.S. Navy	M	1,703.2	0.113	1,104.4	0.057	1,473.2	0.995	1,716.7	0.511
Uniroyal Chemical Co.	PR	0.0	0.000	55.5	0.054	47.3	0.013	75.0	0.064
United Nuclear Corp., Naval Products	FF	2,500.0	0.092	2,774.5	0.075	1,283.9	0.058	13,663.4	0.021
United States Surgical Corporation	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
United Technologies Research Center	ID	0.0	0.000	0.0	0.000	0.0	0.000	1.3	0.002
United Technologies, Hamilton Standard Div.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
United Technologies, Pratt & Whitney Div.	ID	142.5	0.015	0.0	0.000	0.0	0.000	0.0	0.000
United Technologies, Sikorsky Div.	ID	0.0	0.000	0.5	0.001	0.0	0.000	1.6	0.850
Univ. of CT Environ. Health & Safety	IT	267.2	0.093	504.7	0.079	127.5	0.054	97.5	0.461
University of CT Health Center	IT	609.1	0.332	937.5	0.221	1,312.5	0.369	840.0	0.164
V.A. Medical Center	IT	0.0	0.000	8.0	0.001	0.0	0.000	0.0	0.000
VA Connecticut Healthcare System (V.A. Med. Ctr. Hosp.)	IT	46.0	0.038	0.0	0.000	67.5	0.002	0.0	0.000
Valley Medical Laboratory	IT	0.0	0.000	0.0	0.000	0.7	<0.001	5.3	<0.001
Waterbury Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Wesleyan University	IT	15.0	<0.001	45.0	0.003	22.5	<0.001	0.0	0.000
West Hartford, Town of	IT	0.0	0.000	0.0	0.000	5.0	.056	0.0	0.000
Windham Community Memorial Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Yale University	IT	4,798.7	3.631	5,232.6	7.320	4,170.0	5.157	3,457.5	5.113
Yale-New Haven Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	112.5	<0.001
TOTALS		65,513.9	23,886.323	57,388.2	96,451.231	69,070.1	21,883.737	80,100.5	255,162.918

TABLE AP-5B: CONNECTICUT LLRW SHIPPED OFF-SITE FOR MANAGEMENT IN 1991 THROUGH 1994 - BY GENERATOR

GENERATOR	CATEGORY OF GENERATOR	1991 LLRW SHIPPED OFF-SITE FOR MANAGEMENT		1992 LLRW SHIPPED OFF-SITE FOR MANAGEMENT		1993 LLRW SHIPPED OFF-SITE FOR MANAGEMENT		1994 LLRW SHIPPED OFF-SITE FOR MANAGEMENT	
		VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)
ABB Combustion Engineering Nuclear Products	FF	3,824.0	0.045	665.5	0.012	1,203.0	0.034	6,070.0	0.066
ABB Combustion Engineering Nuclear Services	ID	2,603.0	0.707	1,280.0	0.200	3,840.0	0.950	2,560.0	0.500
Advanced Technology Materials, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Aerospace Metals, Inc.	ID	0.0	0.000	7.5	0.001	0.0	0.000	0.0	0.000
Aetna Casualty & Surety	ID	1.2	0.200	0.0	0.000	0.0	0.000	0.0	0.000
Aircraft Components Inc.	ID	757.5	0.027	0.0	0.000	0.0	0.000	0.0	0.000
Alexion Pharmaceuticals	PR	0.0	0.000	0.0	0.000	0.0	0.000	22.5	0.023
Allegheny Ludlum Steel Corp.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
AlliedSignal Engines (Textron Lycoming)	ID	0.0	0.000	0.0	0.000	0.0	0.000	15.0	<0.001
Alpha Q, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	135.0	0.005
Bayer Corporation (Miles Inc.)	PR	276.6	0.274	383.0	0.320	297.0	0.024	462.1	0.221
Bob's Stores, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.7	<0.001
Boehringer Ingelheim Pharmaceuticals	PR	649.2	3.649	360.0	0.903	390.0	0.658	349.9	2.061
Brass Center, Ltd.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Bridgeport Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Bridgeport Metal Goods	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.5	<0.001
Bristol-Myers Squibb	PR	1,153.0	1.582	856.0	0.869	348.8	0.447	262.2	0.275
Buck Scientific Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
CT Agricultural Experiment Station	IT	7.5	0.001	0.0	0.000	0.0	0.000	0.0	0.000
CT Yankee Atomic Power Co.	NPP	11,336.1	337.978	13,699.8	1,477.764	14,499.1	3,662.647	5,814.1	30.638
Central CT State University	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Charlotte Hungerford Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Chesebrough-Pond's USA Co.	PR	0.0	0.000	0.0	0.000	0.0	0.000	0.7	<0.001
Ciba-Geigy (ICI Americas)	PR	271.5	0.014	379.6	0.094	158.2	0.035	235.2	0.145
Clairol	PR	0.0	0.000	0.0	0.000	15.0	<0.001	19.1	0.281
Connecticut College	IT	7.5	0.001	0.0	0.000	0.0	0.000	7.5	<0.001
Connecticut Resources Recovery Authority	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Cuno Inc.	PR	15.0	0.002	0.9	<0.001	0.0	0.000	7.5	0.001
Cytec Industries Inc.	PR	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
DeKalb Genetics Corp.	PR	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Dianon Systems Inc.	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Eastern CT State University	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Electro-Methods, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	22.5	<0.001
Fairfield University	IT	0.0	0.000	0.0	0.000	0.0	0.000	24.0	<0.001
Fischer Technology Inc.	ID	4.0	0.496	0.0	0.000	0.0	0.000	0.0	0.000
General Dynamics, Electric Boat Div.	M	139.1	0.008	60.0	<0.001	64.1	<0.001	109.1	0.001
Groton Board of Education	IT	0.0	0.000	0.0	0.000	0.0	0.000	1.0	<0.001
Hamilton Chemical	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Hartford Hospital	IT	9.9	0.004	9.9	0.004	0.0	0.000	7.5	0.001
Hopkins School	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Hughes Danbury Optical Systems	ID	7.5	0.004	78.0	0.005	82.0	<0.001	67.5	<0.001
International Fuel Cells, Inc.	ID	0.0	0.000	0.0	0.000	7.5	0.040	0.0	0.000
John B. Pierce Laboratory	PR	75.0	0.009	43.0	0.004	0.0	0.000	15.5	0.001
Kodak S.I.S. (International Biotechnologies)	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Middlesex Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000

TABLE AP-5B (continued)

GENERATOR	CATEGORY OF GENERATOR	1991 LLRW SHIPPED OFF-SITE FOR MANAGEMENT		1992 LLRW SHIPPED OFF-SITE FOR MANAGEMENT		1993 LLRW SHIPPED OFF-SITE FOR MANAGEMENT		1994 LLRW SHIPPED OFF-SITE FOR MANAGEMENT	
		VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)
Millstone 1 Northeast Nuclear Power Co.	NPP	20,830.7	2,240.848	25,542.0	23,706.771	7,406.5	1,216.042	68,650.1	294.862
Millstone 2 Northeast Nuclear Power Co.	NPP	5,883.5	877.666	38,325.4	3,676.343	13,579.3	445.440	13,175.5	245.624
Millstone 3 Northeast Nuclear Power Co.	NPP	6,636.1	104.137	2,758.8	480.788	14,266.4	38.468	5,136.2	168.715
Neurogen Corporation	PR	150.0	0.006	135.0	0.008	172.5	0.017	120.0	0.011
New Britain General Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Northrop Grumman Norden Systems (UTC/Westinghouse)	ID	0.0	0.000	0.0	0.000	0.0	0.000	3.4	0.696
Norwalk Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Novo Nordisk Bioindustrials (Novo Labs)	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Nuclear Scanning Associates	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.7	0.008
Olin Research	PR	0.0	0.000	0.0	0.000	0.0	0.000	1.5	0.044
Packard BioScience Company (Canberra Industries)	ID	0.0	0.000	0.0	0.000	43.1	0.010	8.0	0.056
Pfizer Inc.	PR	1,185.0	4.863	2,025.0	6.739	1,474.1	3.774	1,152.2	0.951
Pitney Bowes	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.7	0.200
Protein Sciences Corporation (MicroGene System Inc.)	ID	26.5	0.015	0.0	0.000	4.0	0.002	0.0	0.000
Quinnipiac College	IT	0.0	0.000	7.5	0.013	0.0	0.000	0.0	0.000
RSA Laboratories, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.4	<0.001
Roche Biomedical Laboratories (CYTO-Roche)	PR	67.5	0.008	0.0	0.000	0.0	0.000	4.1	0.001
Rust Utilities Services Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.8	<0.001
Schlumberger-Doll Research	PR	0.0	0.000	4.1	<0.001	0.0	0.000	0.0	0.000
Seymour High School	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Southern CT State University	IT	0.0	0.000	0.0	0.000	8.0	<0.001	0.0	0.000
St. Francis Hospital (St. Francis & Mt. Sinai Campuses)	IT	0.0	0.000	6.3	0.295	4.1	0.277	51.0	<0.001
Stamford Public Schools	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Stanley Works (Laboratory)	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.6	<0.001
State of CT, Office of Emergency Management	IT	0.0	0.000	0.0	0.000	1.7	<0.001	0.0	0.000
Trinity College	IT	14.0	0.002	0.0	0.000	0.0	0.000	0.0	0.000
U.S. Army Connecticut National Guard	M	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
U.S. Coast Guard Academy	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
U.S. Navy	M	1,749.8	0.278	1,044.9	0.117	785.8	1.290	1,559.9	136.860
Uniroyal Chemical Co.	PR	35.5	0.018	0.0	0.000	71.7	0.149	70.8	0.071
United Nuclear Corp., Naval Products	FF	36,016.9	0.393	36,431.8	0.273	437.0	0.083	0.0	0.000
United States Surgical Corporation	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
United Technologies Research Center	ID	0.0	0.000	54.0	3.519	99.5	0.665	0.0	0.000
United Technologies, Hamilton Standard Div.	ID	0.0	0.000	0.0	0.000	0.0	0.000	555.0	0.001
United Technologies, Pratt & Whitney Div.	ID	0.0	0.000	705.0	0.002	0.0	0.000	0.0	0.000
United Technologies, Sikorsky Div.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Univ. of CT Environ. Health & Safety	IT	120.0	0.333	48.5	0.057	15.0	0.023	75.5	0.192
University of CT Health Center	IT	761.6	0.193	780.0	0.179	322.5	0.111	247.5	0.069
V.A. Medical Center	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
VA Connecticut Healthcare System (V.A. Med. Ctr. Hosp.)	IT	15.0	<0.001	11.5	0.072	1.3	<0.001	0.7	0.020
Valley Medical Laboratory	IT	4.0	<0.001	5.3	0.001	0.0	0.000	0.0	0.000
Waterbury Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.7	<0.001
Wesleyan University	IT	37.5	<0.001	30.0	<0.001	16.6	0.007	30.0	0.002
West Hartford, Town of	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Windham Community Memorial Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Yale University	IT	2,906.5	5.432	1,184.9	1.726	964.2	3.649	1,838.1	3.996
Yale-New Haven Hospital	IT	187.5	0.014	97.5	0.007	0.0	0.000	7.5	<0.001
TOTALS		97,765.2	3,579.207	127,020.7	29,357.086	60,578.0	5,374.842	108,900.0	886.600

TABLE AP-5C: CONNECTICUT LLRW SHIPPED OFF-SITE FOR MANAGEMENT IN 1995 THROUGH 1996 - BY GENERATOR

GENERATOR	CATEGORY OF GENERATOR	1995 LLRW SHIPPED OFF-SITE FOR MANAGEMENT		1996 LLRW SHIPPED OFF-SITE FOR MANAGEMENT		1997 LLRW SHIPPED OFF-SITE FOR MANAGEMENT		1998 LLRW SHIPPED OFF-SITE FOR MANAGEMENT	
		VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)
ABB Combustion Engineering Nuclear Products	FF	3,500.0	0.198	903.8	0.037				
ABB Combustion Engineering Nuclear Services	ID	1,323.0	0.100	7,797.5	0.757				
Advanced Technology Materials, Inc.	ID	0.0	0.000	0.4	<0.001				
Aerospace Metals, Inc.	ID	0.0	0.000	0.0	0.000				
Aetna Casualty & Surety	ID	0.0	0.000	0.0	0.000				
Aircraft Components Inc.	ID	0.0	0.000	0.0	0.000				
Alexion Pharmaceuticals	PR	0.0	0.000	0.0	0.000				
Allegheny Ludlum Steel Corp.	ID	0.0	0.000	0.4	<0.001				
AlliedSignal Engines (Textron Lycoming)	ID	764.5	0.019	207.0	0.005				
Alpha Q, Inc.	ID	0.0	0.000	0.0	0.000				
Bayer Corporation (Miles Inc.)	PR	839.5	0.317	811.7	0.248				
Bob's Stores, Inc.	ID	0.0	0.000	0.0	0.000				
Boehringer Ingelheim Pharmaceuticals	PR	95.5	1.008	42.3	0.518				
Brass Center, Ltd.	ID	0.0	0.000	0.2	<0.001				
Bridgeport Hospital	IT	0.0	0.000	7.5	0.023				
Bridgeport Metal Goods	ID	0.0	0.000	0.0	0.000				
Bristol-Myers Squibb	PR	421.3	0.381	294.0	0.482				
Buck Scientific Inc.	ID	0.0	0.000	0.0	0.000				
CT Agricultural Experiment Station	IT	0.0	0.000	0.0	0.000				
CT Yankee Atomic Power Co.	NPP	11,985.2	2.742	14,823.6	1,252.541				
Central CT State University	IT	0.0	0.000	0.0	0.000				
Charlotte Hungerford Hospital	IT	0.0	0.000	0.7	0.001				
Chesebrough-Pond's USA Co.	PR	0.0	0.000	0.0	0.000				
Ciba-Geigy (ICI Americas)	PR	207.2	<0.001	134.8	0.001				
Clairol	PR	15.0	0.007	0.0	0.000				
Connecticut College	IT	0.0	0.000	0.0	0.000				
Connecticut Resources Recovery Authority	IT	0.0	0.000	4.7	<0.001				
Cuno Inc.	PR	0.0	0.000	7.5	0.001				
Cytec Industries Inc.	PR	0.0	0.000	<0.1	<0.001				
DeKalb Genetics Corp.	PR	0.0	0.000	0.0	0.000				
Dianon Systems Inc.	IT	0.0	0.000	0.0	0.000				
Eastern CT State University	IT	0.0	0.000	1.4	<0.001				
Electro-Methods, Inc.	ID	0.0	0.000	0.0	0.000				
Fairfield University	IT	0.0	0.000	0.0	0.000				
Fischer Technology Inc.	ID	0.0	0.000	0.0	0.000				
General Dynamics, Electric Boat Div.	M	97.5	0.006	0.0	0.000				
Groton Board of Education	IT	0.0	0.000	0.0	0.000				
Hamilton Chemical	ID	0.0	0.000	0.4	<0.001				
Hartford Hospital	IT	0.0	0.000	0.0	0.000				
Hopkins School	IT	0.0	0.000	0.1	<0.001				
Hughes Danbury Optical Systems	ID	46.5	<0.001	43.8	<0.001				
International Fuel Cells, Inc.	ID	0.0	0.000	0.0	0.000				
John B. Pierce Laboratory	PR	0.0	0.000	0.0	0.000				
Kodak S.I.S. (International Biotechnologies)	ID	0.0	0.000	0.0	0.000				
Middlesex Hospital	IT	0.0	0.000	0.0	0.000				

TABLE AP-5C (continued)

GENERATOR	CATEGORY OF GENERATOR	1995 LLRW SHIPPED OFF-SITE FOR MANAGEMENT		1996 LLRW SHIPPED OFF-SITE FOR MANAGEMENT		1997 LLRW SHIPPED OFF-SITE FOR MANAGEMENT		1998 LLRW SHIPPED OFF-SITE FOR MANAGEMENT	
		VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)
Millstone 1 Northeast Nuclear Power Co.	NPP	9,903.9	439.260	21,178.9	1,080.916				
Millstone 2 Northeast Nuclear Power Co.	NPP	10,115.0	374.072	7,028.0	75.987				
Millstone 3 Northeast Nuclear Power Co.	NPP	10,741.1	48.108	4,164.2	499.312				
Neurogen Corporation	PR	330.0	0.036	133.0	0.013				
New Britain General Hospital	IT	0.0	0.000	0.0	0.000				
Northrop Grumman Norden Systems (UTC/Westinghouse)	ID	0.0	0.000	0.0	0.000				
Norwalk Hospital	IT	0.0	0.000	0.0	0.000				
Novo Nordisk Bioindustrials (Novo Labs)	ID	0.0	0.000	0.0	0.000				
Nuclear Scanning Associates	IT	0.0	0.000	0.0	0.000				
Olin Research	PR	31.2	0.001	0.0	0.000				
Packard BioScience Company (Canberra Industries)	ID	0.0	0.000	0.0	0.000				
Pfizer Inc.	PR	1,986.3	2.353	1,768.2	2.057				
Pitney Bowes	ID	0.0	0.000	0.0	0.000				
Protein Sciences Corporation (MicroGene System Inc.)	ID	0.0	0.000	0.0	0.000				
Quinnipiac College	IT	0.0	0.000	0.0	0.000				
RSA Laboratories, Inc.	ID	0.0	0.000	0.0	0.000				
Roche Biomedical Laboratories (CYTO-Roche)	PR	0.0	0.000	0.0	0.000				
Rust Utilities Services Inc.	ID	0.0	0.000	0.0	0.000				
Schlumberger-Doll Research	PR	0.0	0.000	0.0	0.000				
Seymour High School	IT	0.0	0.000	0.0	0.000				
Southern CT State University	IT	0.0	0.000	1.1	<0.001				
St. Francis Hospital (St. Francis & Mt. Sinai Campuses)	IT	0.0	0.000	0.0	0.000				
Stamford Public Schools	IT	0.0	0.000	0.0	0.000				
Stanley Works (Laboratory)	ID	0.0	0.000	0.2	<0.001				
State of CT, Office of Emergency Management	IT	0.0	0.000	0.4	<0.001				
Trinity College	IT	0.0	0.000	0.0	0.000				
U.S. Army Connecticut National Guard	M	0.0	0.000	0.0	0.000				
U.S. Coast Guard Academy	IT	0.0	0.000	13.1	191.014				
U.S. Navy	M	571.0	0.139	0.0	0.000				
Uniroyal Chemical Co.	PR	0.0	0.000	997.5	2.002				
United Nuclear Corp., Naval Products	FF	0.0	0.000	74.5	0.018				
United States Surgical Corporation	ID	4.0	<0.001	0.0	0.000				
United Technologies Research Center	ID	0.0	0.000	15.0	0.014				
United Technologies, Hamilton Standard Div.	ID	0.0	0.000	7.4	<0.001				
United Technologies, Pratt & Whitney Div.	ID	0.0	0.000	0.0	0.000				
United Technologies, Sikorsky Div.	ID	0.0	0.000	0.0	0.000				
Univ. of CT Environ. Health & Safety	IT	22.5	<0.001	0.0	0.000				
University of CT Health Center	IT	240.0	0.099	79.0	0.123				
V.A. Medical Center	IT	0.0	0.000	150.0	0.050				
VA Connecticut Healthcare System (V.A. Med. Ctr. Hosp.)	IT	0.0	0.000	0.0	0.000				
Valley Medical Laboratory	IT	0.0	0.000	15.0	<0.001				
Waterbury Hospital	IT	0.0	0.000	0.0	0.000				
Wesleyan University	IT	0.0	0.000	0.0	0.000				
West Hartford, Town of	IT	0.0	0.000	15.0	0.001				
Windham Community Memorial Hospital	IT	0.0	0.000	0.0	0.000				
Yale University	IT	0.0	0.000	3.0	0.001				
Yale-New Haven Hospital	IT	2,163.6	0.627	1,075.9	0.402				
TOTALS	IT	82.9	0.400	0.0	0.000				
		55,486.7	869.873	61,801.2	3,106.525				

TABLE AP-6A: CONNECTICUT LLRW SHIPPED TO DISPOSAL FACILITIES IN 1987 THROUGH 1990 - BY GENERATOR

GENERATOR	CATEGORY OF GENERATOR	1987 LLRW SHIPPED TO DISPOSAL FACILITIES		1988 LLRW SHIPPED TO DISPOSAL FACILITIES		1989 LLRW SHIPPED TO DISPOSAL FACILITIES		1990 LLRW SHIPPED TO DISPOSAL FACILITIES	
		VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)
ABB Combustion Engineering Nuclear Products	FF	2,450.0	0.058	3,446.0	0.122	4,577.0	0.176	1,795.9	0.134
ABB Combustion Engineering Nuclear Services	ID	2,182.0	0.186	1,572.0	0.060	938.0	0.668	272.9	1.781
Advanced Technology Materials, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Aerospace Metals, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Aetna Casualty & Surety	ID	0.0	0.000	0.7	<0.001	0.0	0.000	0.0	0.000
Aircraft Components Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Alexion Pharmaceuticals	PR	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Allegheny Ludlum Steel Corp.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
AlliedSignal Engines (Textron Lycoming)	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Alpha Q, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Bayer Corporation (Miles Inc.)	PR	0.0	0.000	12.0	0.001	63.3	0.093	41.9	0.112
Bob's Stores, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Boehringer Ingelheim Pharmaceuticals	PR	344.0	0.114	62.9	0.474	230.1	0.231	217.3	3.307
Brass Center, Ltd.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Bridgeport Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Bridgeport Metal Goods	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Bristol-Myers Squibb	PR	487.1	0.567	880.0	1.431	1,043.7	0.777	1,252.0	1.137
Buck Scientific Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
CT Agricultural Experiment Station	IT	15.0	0.001	0.0	0.000	0.0	0.000	0.0	0.000
CT Yankee Atomic Power Co.	NPP	11,710.6	544.380	4,622.9	337.514	5,401.9	653.380	5,873.0	220,840.499
Central CT State University	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Charlotte Hungerford Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Chesebrough-Pond's USA Co.	PR	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Ciba-Geigy (ICI Americas)	PR	343.7	0.049	141.0	0.047	318.5	0.102	241.8	0.067
Clairol	PR	4.7	0.014	0.0	0.000	0.0	0.000	0.0	0.000
Connecticut College	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Connecticut Resources Recovery Authority	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Cuno Inc.	PR	0.0	0.000	4.0	<0.001	4.4	0.003	2.2	0.001
Cytec Industries Inc.	PR	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
DeKalb Genetics Corp.	PR	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Dianon Systems Inc.	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Eastern CT State University	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Electro-Methods, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Fairfield University	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Fischer Technology Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
General Dynamics, Electric Boat Div.	M	0.0	0.000	397.5	0.001	0.0	0.000	0.0	0.000
Groton Board of Education	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Hamilton Chemical	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Hartford Hospital	IT	45.7	0.009	27.0	0.006	26.6	0.006	0.0	0.000
Hopkins School	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Hughes Danbury Optical Systems	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
International Fuel Cells, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
John B. Pierce Laboratory	PR	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Kodak S.I.S. (International Biotechnologies)	ID	0.0	0.000	52.5	0.010	15.0	0.010	0.0	0.000
Middlesex Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000

TABLE AP-6A (continued)

GENERATOR	CATEGORY OF GENERATOR	1987 LLRW SHIPPED TO DISPOSAL FACILITIES		1988 LLRW SHIPPED TO DISPOSAL FACILITIES		1989 LLRW SHIPPED TO DISPOSAL FACILITIES		1990 LLRW SHIPPED TO DISPOSAL FACILITIES	
		VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)
Millstone 1 Northeast Nuclear Power Co.	NPP	12,828.0	505.168	9,855.1	95,518.615	15,944.6	19,916.247	10,383.5	34,111.814
Millstone 2 Northeast Nuclear Power Co.	NPP	3,424.4	22,764.019	5,597.9	50.299	9,806.0	554.830	5,641.7	9.338
Millstone 3 Northeast Nuclear Power Co.	NPP	2,756.0	59.131	5,757.9	533.738	5,523.9	738.129	2,682.0	176.476
Neurogen Corporation	PR	0.0	0.000	0.0	0.000	0.0	0.000	4.5	<0.001
New Britain General Hospital	IT	0.0	0.000	0.0	0.000	7.5	0.295	0.0	0.000
Northrop Grumman Norden Systems (UTC/Westinghouse)	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Norwalk Hospital	IT	184.0	0.003	226.0	0.239	158.6	0.254	75.0	0.015
Novo Nordisk Bioindustrials (Novo Labs)	ID	8.0	0.005	0.0	0.000	0.0	0.000	0.0	0.000
Nuclear Scanning Associates	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Olin Research	PR	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Packard BioScience Company (Canberra Industries)	ID	0.0	0.000	0.0	0.000	0.7	0.009	0.0	0.000
Pfizer Inc.	PR	570.0	8.285	487.5	0.337	221.5	12.234	373.3	8.272
Pitney Bowes	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Protein Sciences Corporation (MicroGene System Inc.)	ID	4.0	0.013	0.0	0.000	0.0	0.000	0.0	0.000
Quinnipiac College	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
RSA Laboratories, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Roche Biomedical Laboratories (CYTO-Roche)	PR	44.0	0.001	7.1	0.001	13.8	0.005	30.0	0.004
Rust Utilities Services Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Schlumberger-Doll Research	PR	22.5	<0.001	0.0	0.000	0.0	0.000	0.0	0.000
Seymour High School	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Southern CT State University	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
St. Francis Hospital (St. Francis & Mt. Sinai Campuses)	IT	0.0	0.000	0.0	0.000	15.0	<0.001	1.2	<0.001
Stamford Public Schools	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Stanley Works (Laboratory)	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
State of CT, Office of Emergency Management	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Trinity College	IT	0.0	0.000	0.0	0.000	24.5	<0.001	0.0	0.000
U.S. Army Connecticut National Guard	M	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
U.S. Coast Guard Academy	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
U.S. Navy	M	1,703.2	0.113	1,104.4	0.057	1,473.2	0.995	1,716.7	0.511
Uniroyal Chemical Co.	PR	0.0	0.000	0.0	0.000	21.9	0.028	1.1	0.004
United Nuclear Corp., Naval Products	FF	2,500.0	0.092	2,774.5	0.075	1,283.9	0.058	1,548.8	0.021
United States Surgical Corporation	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
United Technologies Research Center	ID	0.0	0.000	0.0	0.000	0.0	0.000	1.3	0.002
United Technologies, Hamilton Standard Div.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
United Technologies, Pratt & Whitney Div.	ID	142.5	0.015	0.0	0.000	0.0	0.000	0.0	0.000
United Technologies, Sikorsky Div.	ID	0.0	0.000	0.5	0.001	0.0	0.000	1.6	0.850
Univ. of CT Environ. Health & Safety	IT	267.2	0.093	96.3	0.069	50.6	0.053	40.8	0.456
University of CT Health Center	IT	349.0	0.314	193.5	0.190	300.8	0.182	276.6	0.297
V.A. Medical Center	IT	46.0	0.038	8.0	0.001	67.5	0.002	0.0	0.000
VA Connecticut Healthcare System (V.A. Med. Ctr. Hosp.)	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Valley Medical Laboratory	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Waterbury Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Wesleyan University	IT	15.0	<0.001	10.0	0.003	6.2	<0.001	0.0	0.000
West Hartford, Town of	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Windham Community Memorial Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Yale University	IT	3,467.4	3.457	2,403.4	7.048	1,552.8	4.918	1,758.1	5.061
Yale-New Haven Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
TOTALS		45,914.0	23,886.125	39,740.6	96,450.339	49,091.5	21,883.685	34,233.2	255,160.159

TABLE AP-6B: CONNECTICUT LLRW SHIPPED TO DISPOSAL FACILITIES IN 1991 THROUGH 1994 - BY GENERATOR

GENERATOR	CATEGORY OF GENERATOR	1991 LLRW SHIPPED TO DISPOSAL FACILITIES		1992 LLRW SHIPPED TO DISPOSAL FACILITIES		1993 LLRW SHIPPED TO DISPOSAL FACILITIES		1994 LLRW SHIPPED TO DISPOSAL FACILITIES	
		VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)
ABB Combustion Engineering Nuclear Products	FF	721.0	0.045	301.6	0.012	429.9	0.034	6,070.0	0.066
ABB Combustion Engineering Nuclear Services	ID	516.7	2.010	34.2	0.200	218.0	0.950	109.4	0.429
Advanced Technology Materials, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Aerospace Metals, Inc.	ID	0.0	0.000	7.5	0.001	0.0	0.000	0.0	0.000
Aetna Casualty & Surety	ID	1.2	0.200	0.0	0.000	0.0	0.000	0.0	0.000
Aircraft Components Inc.	ID	281.0	0.027	0.0	0.000	0.0	0.000	0.0	0.000
Alexion Pharmaceuticals	PR	0.0	0.000	0.0	0.000	0.0	0.000	5.4	0.023
Allegheny Ludlum Steel Corp.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
AlliedSignal Engines (Textron Lycoming)	ID	0.0	0.000	0.0	0.000	0.0	0.000	15.0	<0.001
Alpha Q, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	135.0	0.005
Bayer Corporation (Miles Inc.)	PR	67.9	0.255	139.9	0.319	50.6	0.019	97.5	0.205
Bob's Stores, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.7	<0.001
Boehringer Ingelheim Pharmaceuticals	PR	299.4	7.787	301.5	0.657	297.1	0.666	183.5	2.056
Brass Center, Ltd.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Bridgeport Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Bridgeport Metal Goods	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.5	<0.001
Bristol-Myers Squibb	PR	913.0	1.517	691.0	0.850	82.9	0.435	30.1	0.266
Buck Scientific Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.7	0.062
CT Agricultural Experiment Station	IT	0.9	0.001	0.0	0.000	0.0	0.000	0.0	0.000
CT Yankee Atomic Power Co.	NPP	4,733.1	337.303	4,976.7	1,477.764	2,135.5	3,662.425	1,016.6	30.634
Central CT State University	IT	0.0	0.000	0.0	0.000	0.0	0.000	2.0	<0.001
Charlotte Hungerford Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Chesebrough-Pond's USA Co.	PR	0.0	0.000	0.0	0.000	0.0	0.000	0.7	<0.001
Ciba-Geigy (ICI Americas)	PR	431.1	0.303	220.9	0.091	20.1	0.038	68.4	0.145
Clairol	PR	0.4	0.001	0.0	0.000	0.6	<0.001	16.0	0.281
Connecticut College	IT	7.5	0.001	0.0	0.000	0.0	0.000	1.2	<0.001
Connecticut Resources Recovery Authority	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Cuno Inc.	PR	7.5	0.001	0.9	<0.001	0.0	0.000	7.5	0.001
Cytec Industries Inc.	PR	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
DeKalb Genetics Corp.	PR	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Dianon Systems Inc.	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Eastern CT State University	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Electro-Methods, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	1.1	<0.001
Fairfield University	IT	0.0	0.000	0.0	0.000	0.0	0.000	1.7	<0.001
Fischer Technology Inc.	ID	4.0	0.496	0.0	0.000	0.0	0.000	0.0	0.000
General Dynamics, Electric Boat Div.	M	139.1	0.008	60.0	<0.001	64.1	<0.001	109.1	0.001
Groton Board of Education	IT	0.0	0.000	0.0	0.000	0.0	0.000	1.0	<0.001
Hamilton Chemical	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Hartford Hospital	IT	9.9	0.004	9.9	0.004	0.0	0.000	7.5	0.001
Hopkins School	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Hughes Danbury Optical Systems	ID	7.5	0.004	78.0	0.005	65.3	<0.001	72.4	<0.001
International Fuel Cells, Inc.	ID	0.0	0.000	0.0	0.000	7.5	0.040	0.0	0.000
John B. Pierce Laboratory	PR	33.4	0.007	13.9	0.004	0.0	0.000	11.0	0.001
Kodak S.I.S. (International Biotechnologies)	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Middlesex Hospital	IT	7.5	0.220	0.0	0.000	0.0	0.000	0.0	0.000

TABLE AP-6B (continued)

GENERATOR	CATEGORY OF GENERATOR	1991 LLRW SHIPPED TO DISPOSAL FACILITIES VOLUME (cu ft)	1991 RADIO-ACTIVITY (Curies)	1992 LLRW SHIPPED TO DISPOSAL FACILITIES VOLUME (cu ft)	1992 RADIO-ACTIVITY (Curies)	1993 LLRW SHIPPED TO DISPOSAL FACILITIES VOLUME (cu ft)	1993 RADIO-ACTIVITY (Curies)	1994 LLRW SHIPPED TO DISPOSAL FACILITIES VOLUME (cu ft)	1994 RADIO-ACTIVITY (Curies)
Millstone 1 Northeast Nuclear Power Co.	NPP	12,402.7	2,241.655	9,730.2	23,707.688	3,553.5	1,213.033	5,031.2	294.907
Millstone 2 Northeast Nuclear Power Co.	NPP	4,817.8	878.928	26,809.3	3,676.375	3,791.3	448.405	2,124.5	246.420
Millstone 3 Northeast Nuclear Power Co.	NPP	4,086.2	104.218	1,456.5	480.512	1,923.2	37.015	1,149.2	169.231
Neurogen Corporation	PR	91.5	0.003	78.0	0.006	16.1	0.012	43.4	0.010
New Britain General Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Northrop Grumman Norden Systems (UTC/Westinghouse)	ID	0.0	0.000	0.0	0.000	0.0	0.000	3.4	0.696
Norwalk Hospital	IT	11.5	<0.001	0.0	0.000	0.0	0.000	0.0	0.000
Novo Nordisk Bioindustrials (Novo Labs)	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Nuclear Scanning Associates	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.7	0.008
Olin Research	PR	0.0	0.000	0.0	0.000	0.0	0.000	1.5	0.044
Packard BioScience Company (Canberra Industries)	ID	0.0	0.000	0.0	0.000	39.1	0.009	4.9	0.056
Pfizer Inc.	PR	339.8	4.588	650.9	6.621	388.4	2.338	329.3	0.849
Pitney Bowes	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.7	0.200
Protein Sciences Corporation (MicroGene System Inc.)	ID	26.5	0.015	0.0	0.000	0.8	0.002	0.0	0.000
Quinnipiac College	IT	0.0	0.000	1.3	0.013	0.0	0.000	0.0	0.000
RSA Laboratories, Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.4	<0.001
Roche Biomedical Laboratories (CYTO-Roche)	PR	16.6	0.002	0.0	0.000	0.0	0.000	4.1	0.001
Rust Utilities Services Inc.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.8	<0.001
Schlumberger-Doll Research	PR	0.0	0.000	4.1	<0.001	0.0	0.000	0.0	0.000
Seymour High School	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Southern CT State University	IT	0.0	0.000	0.0	0.000	8.0	<0.001	0.0	0.000
St. Francis Hospital (St. Francis & Mt. Sinai Campuses)	IT	0.0	0.000	6.3	0.295	4.1	0.277	0.0	0.000
Stamford Public Schools	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Stanley Works (Laboratory)	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.6	<0.001
State of CT, Office of Emergency Management	IT	0.0	0.000	0.0	0.000	1.7	<0.001	0.0	0.000
Trinity College	IT	0.0	0.000	1.6	0.001	0.0	0.000	0.0	0.000
U.S. Army Connecticut National Guard	M	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
U.S. Coast Guard Academy	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
U.S. Navy	M	1,749.8	0.278	1,044.9	0.117	785.8	1.290	1,559.9	136.860
Uniroyal Chemical Co.	PR	150.6	0.166	8.1	0.017	21.3	0.109	105.4	0.114
United Nuclear Corp., Naval Products	FF	14,762.5	0.393	27,141.9	0.273	437.0	0.083	0.0	0.000
United States Surgical Corporation	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
United Technologies Research Center	ID	0.0	0.000	54.0	3.519	22.5	0.665	0.0	0.000
United Technologies, Hamilton Standard Div.	ID	0.0	0.000	0.0	0.000	0.0	0.000	555.0	0.001
United Technologies, Pratt & Whitney Div.	ID	0.0	0.000	705.0	0.002	0.0	0.000	0.0	0.000
United Technologies, Sikorsky Div.	ID	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Univ. of CT Environ. Health & Safety	IT	54.2	0.324	20.1	0.057	7.9	0.023	44.5	0.192
University of CT Health Center	IT	220.4	0.192	213.9	0.161	68.6	0.104	64.0	0.057
V.A. Medical Center	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
VA Connecticut Healthcare System (V.A. Med. Ctr. Hosp.)	IT	15.0	<0.001	11.5	0.072	1.3	<0.001	0.7	0.020
Valley Medical Laboratory	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Waterbury Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.7	<0.001
Wesleyan University	IT	6.3	<0.001	3.8	<0.001	5.1	0.007	8.6	0.002
West Hartford, Town of	IT	0.0	0.000	0.0	0.000	0.0	0.000	5.0	0.056
Windham Community Memorial Hospital	IT	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Yale University	IT	1,851.5	5.380	755.0	1.705	563.7	3.609	330.5	3.917
Yale-New Haven Hospital	IT	85.5	0.014	48.9	0.007	0.0	0.000	4.9	0.001
TOTALS		48,870.5	3,586.346	75,581.3	29,357.347	15,011.0	5,371.588	19,337.9	887.818

TABLE AP-6C: CONNECTICUT LLRW SHIPPED TO DISPOSAL FACILITIES IN 1995 THROUGH 1996 - BY GENERATOR

GENERATOR	CATEGORY OF GENERATOR	1995 LLRW SHIPPED TO DISPOSAL FACILITIES		1996 LLRW SHIPPED TO DISPOSAL FACILITIES		1997 LLRW SHIPPED TO DISPOSAL FACILITIES		1998 LLRW SHIPPED TO DISPOSAL FACILITIES	
		VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)
ABB Combustion Engineering Nuclear Products	FF	3,500.0	0.198	900.0	0.037				
ABB Combustion Engineering Nuclear Services	ID	2.2	0.100	12.0	0.196				
Advanced Technology Materials, Inc.	ID	0.0	0.000	0.2	<0.001				
Aerospace Metals, Inc.	ID	0.0	0.000	0.0	0.000				
Aetna Casualty & Surety	ID	0.0	0.000	0.0	0.000				
Aircraft Components Inc.	ID	0.0	0.000	0.0	0.000				
Alexion Pharmaceuticals	PR	0.0	0.000	0.0	0.000				
Allegheny Ludlum Steel Corp.	ID	0.0	0.000	0.4	<0.001				
AlliedSignal Engines (Textron Lycoming)	ID	0.0	0.000	5.6	<0.001				
Alpha Q, Inc.	ID	0.0	0.000	0.0	0.000				
Bayer Corporation (Miles Inc.)	PR	151.2	0.264	167.8	0.255				
Bob's Stores, Inc.	ID	0.0	0.000	0.0	0.000				
Boehringer Ingelheim Pharmaceuticals	PR	12.5	0.451	63.9	1.036				
Brass Center, Ltd.	ID	0.0	0.000	0.2	<0.001				
Bridgeport Hospital	IT	0.0	0.000	1.2	0.023				
Bridgeport Metal Goods	ID	0.0	0.000	0.0	0.000				
Bristol-Myers Squibb	PR	3.4	0.002	1.4	0.177				
Buck Scientific Inc.	ID	0.0	0.000	0.0	0.000				
CT Agricultural Experiment Station	IT	0.0	0.000	0.0	0.000				
CT Yankee Atomic Power Co.	NPP	614.7	2.422	1,557.1	1,196.031				
Central CT State University	IT	0.0	0.000	0.0	0.000				
Charlotte Hungerford Hospital	IT	0.0	0.000	0.0	0.000				
Chesebrough-Pond's USA Co.	PR	0.0	0.000	0.0	0.000				
Ciba-Geigy (ICI Americas)	PR	0.0	0.000	9.2	0.001				
Clairol	PR	2.4	0.005	0.0	0.000				
Connecticut College	IT	0.0	0.000	0.0	0.000				
Connecticut Resources Recovery Authority	IT	0.0	0.000	4.1	<0.001				
Cuno Inc.	PR	0.0	0.000	0.0	0.000				
Cytec Industries Inc.	PR	0.0	0.000	<0.1	<0.001				
DeKalb Genetics Corp.	PR	0.0	0.000	0.0	0.000				
Dianon Systems Inc.	IT	0.0	0.000	0.0	0.000				
Eastern CT State University	IT	0.0	0.000	1.4	<0.001				
Electro-Methods, Inc.	ID	0.0	0.000	0.0	0.000				
Fairfield University	IT	0.0	0.000	0.0	0.000				
Fischer Technology Inc.	ID	0.0	0.000	0.0	0.000				
General Dynamics, Electric Boat Div.	M	97.5	0.006	0.0	0.000				
Groton Board of Education	IT	0.0	0.000	0.0	0.000				
Hamilton Chemical	ID	0.0	0.000	0.4	<0.001				
Hartford Hospital	IT	0.0	0.000	0.0	0.000				
Hopkins School	IT	0.0	0.000	0.1	<0.001				
Hughes Danbury Optical Systems	ID	11.0	<0.001	18.3	<0.001				
International Fuel Cells, Inc.	ID	0.0	0.000	0.0	0.000				
John B. Pierce Laboratory	PR	0.0	0.000	0.0	0.000				
Kodak S.I.S. (International Biotechnologies)	ID	0.0	0.000	0.0	0.000				
Middlesex Hospital	IT	0.0	0.000	0.0	0.000				

TABLE AP-6C (continued)

GENERATOR	CATEGORY OF GENERATOR	1995 LLRW SHIPPED TO DISPOSAL FACILITIES		1996 LLRW SHIPPED TO DISPOSAL FACILITIES		1997 LLRW SHIPPED TO DISPOSAL FACILITIES		1998 LLRW SHIPPED TO DISPOSAL FACILITIES	
		VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)	VOLUME (cu ft)	RADIO-ACTIVITY (Curies)
Millstone 1 Northeast Nuclear Power Co.	NPP	2,673.6	423.152	4,264.8	1,096.556				
Millstone 2 Northeast Nuclear Power Co.	NPP	1,238.4	369.348	1,366.2	73.172				
Millstone 3 Northeast Nuclear Power Co.	NPP	750.2	43.403	2,101.9	525.599				
Neurogen Corporation	PR	43.4	0.025	23.0	0.010				
New Britain General Hospital	IT	0.0	0.000	0.0	0.000				
Northrop Grumman Norden Systems (UTC/Westinghouse)	ID	0.0	0.000	0.0	0.000				
Norwalk Hospital	IT	0.0	0.000	0.0	0.000				
Novo Nordisk Bioindustrials (Novo Labs)	ID	0.0	0.000	0.0	0.000				
Nuclear Scanning Associates	IT	0.0	0.000	0.0	0.000				
Olin Research	PR	7.1	0.001	0.0	0.000				
Packard BioScience Company (Canberra Industries)	ID	0.0	0.000	0.0	0.000				
Pfizer Inc.	PR	1.4	0.026	34.0	1.453				
Pitney Bowes	ID	0.0	0.000	0.0	0.000				
Protein Sciences Corporation (MicroGene System Inc.)	ID	0.0	0.000	0.0	0.000				
Quinnipiac College	IT	0.0	0.000	0.0	0.000				
RSA Laboratories, Inc.	ID	0.0	0.000	0.0	0.000				
Roche Biomedical Laboratories (CYTO-Roche)	PR	0.0	0.000	0.0	0.000				
Rust Utilities Services Inc.	ID	0.0	0.000	0.0	0.000				
Schlumberger-Doll Research	PR	0.0	0.000	0.0	0.000				
Seymour High School	IT	0.0	0.000	0.0	0.000				
Southern CT State University	IT	0.0	0.000	0.0	0.000				
St. Francis Hospital (St. Francis & Mt. Sinai Campuses)	IT	0.0	0.000	0.0	0.000				
Stamford Public Schools	IT	0.0	0.000	0.2	<0.001				
Stanley Works (Laboratory)	ID	0.0	0.000	0.4	<0.001				
State of CT, Office of Emergency Management	IT	0.0	0.000	0.0	0.000				
Trinity College	IT	0.0	0.000	0.0	0.000				
U.S. Army Connecticut National Guard	M	0.0	0.000	13.1	191.014				
U.S. Coast Guard Academy	IT	0.0	0.000	0.0	0.000				
U.S. Navy	M	571.0	0.139	997.5	2.002				
Uniroyal Chemical Co.	PR	0.0	0.000	4.1	0.003				
United Nuclear Corp., Naval Products	FF	0.0	0.000	0.0	0.000				
United States Surgical Corporation	ID	0.0	0.000	1.4	0.014				
United Technologies Research Center	ID	0.0	0.000	0.0	0.000				
United Technologies, Hamilton Standard Div.	ID	0.0	0.000	0.0	0.000				
United Technologies, Pratt & Whitney Div.	ID	0.0	0.000	0.0	0.000				
United Technologies, Sikorsky Div.	IT	0.0	0.000	0.0	0.000				
Univ. of CT Environ. Health & Safety	IT	0.0	0.000	35.2	0.049				
University of CT Health Center	IT	4.7	0.002	92.5	0.110				
V.A. Medical Center	IT	0.0	0.000	0.0	0.000				
VA Connecticut Healthcare System (V.A. Med. Ctr. Hosp.)	IT	0.0	0.000	0.0	0.000				
Valley Medical Laboratory	IT	0.0	0.000	0.0	0.000				
Waterbury Hospital	IT	0.0	0.000	0.0	0.000				
Wesleyan University	IT	0.0	0.000	5.3	0.001				
West Hartford, Town of	IT	0.0	0.000	0.0	0.000				
Windham Community Memorial Hospital	IT	0.0	0.000	0.0	0.000				
Yale University	IT	29.2	0.169	46.1	0.181				
Yale-New Haven Hospital	IT	0.0	0.000	40.9	0.005				
TOTALS		**9,713.9**	**839.713**	**11,769.9**	**3,087.925**				

TABLE AP-7: CONNECTICUT LLRW SHIPPED OFF-SITE FOR MANAGEMENT AND TO DISPOSAL FACILITIES IN 1996 - BY GENERATOR AND CATEGORY OF GENERATOR

GENERATOR	LLRW SHIPPED OFF-SITE FOR MANAGEMENT		LLRW SHIPPED TO DISPOSAL FACILITIES	
	VOLUME (cu ft)	RADIOACTIVITY (Curies)	VOLUME (cu ft)	RADIOACTIVITY (Curies)
FUEL FABRICATION				
ABB Combustion Engineering Nuclear Products	903.8	0.037	900.0	0.037
TOTAL FUEL FABRICATION	**903.8**	**0.037**	**900.0**	**0.037**
INDUSTRIAL				
ABB Combustion Engineering Nuclear Services	7,797.5	0.757	12.0	0.196
Advanced Technology Materials, Inc.	0.4	<0.001	0.2	<0.001
Allegheny Ludlum Steel Corp.	0.4	<0.001	0.4	<0.001
AlliedSignal Engines (Textron Lycoming)	207.0	0.005	5.6	<0.001
Brass Center, Ltd.	0.2	<0.001	0.2	<0.001
Hamilton Chemical	0.4	<0.001	0.4	<0.001
Hughes Danbury Optical Systems	43.8	<0.001	18.3	<0.001
Stanley Works (Laboratory)	0.4	<0.001	0.4	<0.001
United States Surgical Corporation	15.0	0.014	1.4	0.014
United Technologies Research Center	7.4	<0.001	0.0	0.000
TOTAL INDUSTRIAL	**8,072.5**	**0.776**	**38.9**	**0.210**
INSTITUTIONAL				
Bridgeport Hospital	7.5	0.023	1.2	0.023
Charlotte Hungerford Hospital	0.7	0.001	0.0	0.000
Connecticut Resources Recovery Authority	4.7	<0.001	4.1	<0.001
Eastern CT State University	1.4	<0.001	1.4	<0.001
Hopkins School	0.1	<0.001	0.1	<0.001
Seymour High School	1.1	<0.001	0.0	0.000
Stamford Public Schools	0.2	<0.001	0.2	<0.001
Univ. of CT Environ. Health & Safety	79.0	0.123	35.2	0.049
University of CT Health Center	150.0	0.050	92.5	0.110
VA Connecticut Healthcare System (V.A. Med. Ctr. Hosp.)	15.0	<0.001	0.0	0.000
Wesleyan University	15.0	0.001	5.3	0.001
Windham Community Memorial Hospital	3.0	0.001	0.0	0.000
Yale University	1,075.9	0.402	46.1	0.181
Yale-New Haven Hospital	0.0	0.000	40.9	0.005
TOTAL INSTITUTIONAL	**1,353.6**	**0.601**	**227.0**	**0.369**
MILITARY				
U.S. Army Connecticut National Guard	13.1	191.014	13.1	191.014
U.S. Navy	997.5	2.002	997.5	2.002
TOTAL MILITARY	**1,010.6**	**193.016**	**1,010.6**	**193.016**
NUCLEAR POWER PLANTS				
CT Yankee Atomic Power Co.	14,823.6	1,252.541	1,557.1	1,196.031
Millstone 1 Northeast Nuclear Power Co.	21,178.9	1,080.916	4,264.8	1,096.556
Millstone 2 Northeast Nuclear Power Co.	7,028.0	75.987	1,366.2	73.172
Millstone 3 Northeast Nuclear Power Co.	4,164.2	499.312	2,101.9	525.599
TOTAL NUCLEAR POWER PLANTS	**47,194.7**	**2,908.756**	**9,290.0**	**2,891.358**
PRIVATE RESEARCH				
Bayer Corporation (Miles Inc.)	811.7	0.248	167.8	0.255
Boehringer Ingelheim Pharmaceuticals	42.3	0.518	63.9	1.036
Bristol-Myers Squibb	294.0	0.482	1.4	0.177
Ciba-Geigy (ICI Americas)	134.8	0.001	9.2	0.001
Cuno Inc.	7.5	0.001	0.0	0.000
Cytec Industries Inc.	<0.1	<0.001	<0.1	<0.001
Neurogen Corporation	133.0	0.013	23.0	0.010
Pfizer Inc.	1,768.2	2.058	34.0	1.453
Uniroyal Chemical Co.	74.5	0.018	4.1	0.003
TOTAL PRIVATE RESEARCH	**3,266.0**	**3.339**	**303.4**	**2.935**
TOTALS	**61,801.2**	**3,106.525**	**11,769.9**	**3,087.925**

TABLE AP-8: CONNECTICUT LLRW SHIPPED OFF-SITE IN 1996 - BY CATEGORY OF GENERATOR

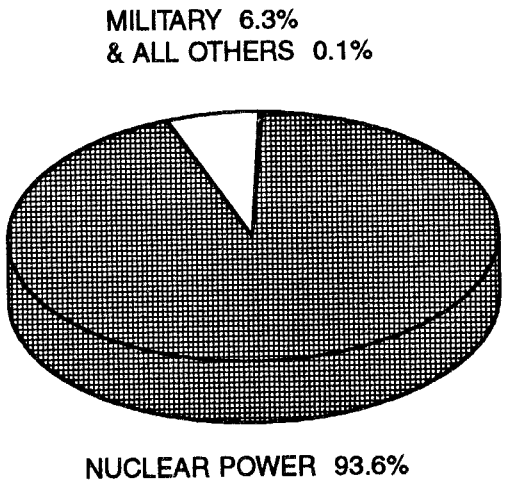
CATEGORY OF GENERATOR	VOLUME		RADIOACTIVITY	
	cu ft	%	Curies	%
FUEL FABRICATION	903.8	1.5	0.037	<0.1
INDUSTRIAL	8,072.5	13.1	0.776	<0.1
INSTITUTIONAL	1,353.6	2.2	0.601	<0.1
MILITARY	1,010.6	1.6	193.016	6.2
NUCLEAR POWER PLANTS	47,194.7	76.4	2,908.756	93.6
PRIVATE RESEARCH	3,266.0	5.3	3.339	0.1
TOTALS	**61,801.2**	**100.0%[1]**	3,106.525	100.0%

TABLE AP-9: CONNECTICUT LLRW SHIPPED TO DISPOSAL FACILITIES IN 1996- BY CATEGORY OF GENERATOR

CATEGORY OF GENERATOR	VOLUME		RADIOACTIVITY	
	cu ft	%	Curies	%
FUEL FABRICATION	900.0	7.6	0.037	<0.1
INDUSTRIAL	38.9	0.3	0.210	<0.1
INSTITUTIONAL	227.0	1.9	0.369	<0.1
MILITARY	1,010.6	8.6	193.016	6.3
NUCLEAR POWER PLANTS	9,290.0	78.9	2,891.358	93.6
PRIVATE RESEARCH	303.4	2.6	2.935	0.1
TOTALS	**11,769.9**	**100.0%[1]**	**3,087.925**	**100.0%[1]**

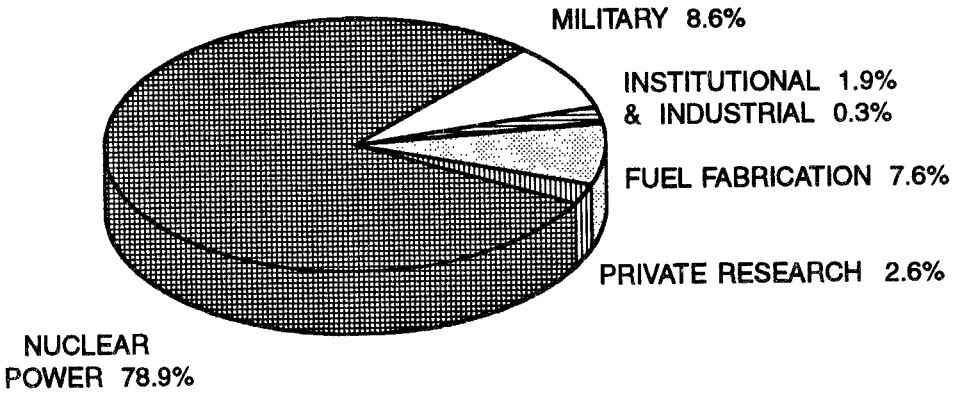
[1] The figures above do not add precisely to 100% because of rounding effects.

FIGURE AP-1: CONNECTICUT LLRW SHIPPED TO DISPOSAL FACILITIES IN 1996 - BY CATEGORY OF GENERATOR



RADIOACTIVITY

(Percent of 3,087.925 Curies)



VOLUME

(Percent of 11,769.9 Cubic Feet)

TABLE AP-10: WASTE GROUPS AND STREAMS

NUCLEAR REGULATORY COMMISSION

NUCLEAR POWER PLANTS

Pressurized Water Reactors

P-COTRASH	PWR Combustible/Compactible Trash
P-FCARTRG	PWR Cartridge Filters
P-FSLUDGE	PWR Filter Sludges
P-IXRESIN	PWR Ion-Exchange Resins
P-NCTRASH	PWR Noncombustible/Noncompactible Trash

Boiling Water Reactors

B-COTRASH	BWR Combustible/Compactible Trash
B-FCARTRG	BWR Cartridge Filters
B-FSLUDGE	BWR Filter Sludges
B-IXRESIN	BWR Ion-Exchange Resins
B-NCTRASH	BWR Noncombustible/Noncompactible Trash

Light Water Reactors (Pressurized and Boiling Water)

L-NFRCOMP	LWR Nonfuel Reactor Core Components

OTHER NUCLEAR FUEL CYCLE FACILITIES

F-PROCESS	Fuel Fabrication Process Wastes
F-COTRASH	Fuel Fab. Combustible/Compactible Trash
F-NCTRASH	Fuel Fab. Noncombust./Noncompact. Trash

INSTITUTIONAL WASTE

I-COTRASH	Combust./Compact. Trash (large fac.)
I+COTRASH	Combust./Compact. Trash (small fac.)
I-ABSLIQD	Absorbed Liquids (large facilities)
I+ABSLIQD	Absorbed Liquids (small facilities)
I-LIQSCVL	LSV* Waste (large facilities)
I+LIQSCVL	LSV* Waste (small facilities)
I-BIOWAST	Biological Waste (large facilities)
I+BIOWAST	Biological Waste (small facilities)

INDUSTRIAL WASTE

N-LOTRASH	Low Activity Trash (large facilities)
N+LOTRASH	Low Activity Trash (small facilities)
N-LOWASTE	Low Activity Waste

OTHER NON-FUEL CYCLE WASTE

Radium Sources

N-RAMISCL	Miscellaneous Non-Medical Sources

MILITARY

M-NAVYDRY	Navy Dry Waste
M-NAVYWET	Navy Wet Waste

CONNECTICUT HAZARDOUS WASTE MANAGEMENT SERVICE

NUCLEAR POWER PLANTS

Pressurized Water Reactors

P-COTRASH	PWR Combustible/Compactible Trash
P-FCARTRG	PWR Cartridge Filters
P-FSLUDGE	PWR Filter Sludges
P-IXRESIN	PWR Ion-Exchange Resins
P-NCTRASH	PWR Noncombustible/Noncompactible Trash

Boiling Water Reactors

B-COTRASH	BWR Combustible/Compactible Trash
B-FCARTRG	BWR Cartridge Filters
B-FSLUDGE	BWR Filter Sludges
B-IXRESIN	BWR Ion-Exchange Resins
B-NCTRASH	BWR Noncombustible/Noncompactible Trash

Light Water Reactors (Pressurized and Boiling Water)

L-NFRCOMP	LWR Nonfuel Reactor Core Components (Combined)
B-NFRCOMP	BWR Nonfuel Reactor Core Components
P-NFRCOMP	PWR Nonfuel Reactor Core Components

Other

O-METDCON	Metal Sent for Decontamination
O-MIXWAST	Mixed Waste
O-MISCLNS	Miscellaneous Non-Hazardous Oils, Sludges, Etc.

FUEL FABRICATION

F-PROCESS	Fuel Fabrication Process Wastes
F-COTRASH	Fuel Fab. Combustible/Compactible Trash
F-NCTRASH	Fuel Fab. Noncombust./Noncompact. Trash
F-MIXWAST	Fuel Fab. Mixed Wastes, Miscellaneous

INSTITUTIONAL AND PRIVATE RESEARCH WASTE

I=COTRASH	Combust./Compact. Trash (large & small fac.)
I=ABSLIQD	Absorbed or Solidified Liquids (large and small facilities)
I=LIQSCVL	LSV* Waste (large & small facilities)
I=BIOWAST	Biological Waste (large & small facilities)
I=NCTRASH	Noncombust./Noncompact. Trash (large & small fac.)
I=MISCSOR	Miscellaneous Sealed Sources and Devices
I=RAMISCL	Miscellaneous Radium Sources
I=MWORLQD	Miscellaneous Mixed Waste Organic Liquids
I=AQULIQD	Miscellaneous Aqueous Liquids
I=NORM	Naturally Occuring Radioactive Material

INDUSTRIAL WASTE

N=LOTRASH	Low Activity Trash (large & small facilities)
N-LOWASTE	Low Activity Waste
N-MISCSOR	Miscellaneous Sealed Sources and Devices
N-LIQSCVL	LSV* Waste (non-research commercial use)
N-SOAQLQD	Solidified Aqueous Liquids
N-NORM	Naturally Occurring Radioactive Material
N-MIXWAST	Miscellaneous Mixed Wastes

OTHER NON-FUEL CYCLE WASTE

Radium Sources

N-RAMISCL	Miscellaneous Non-Medical Sources

MILITARY

M-NAVYDRY	Navy Dry Waste
M-NAVYWET	Navy Wet Waste
M-MIXWAST	Navy Mixed Waste
M-ARMYWST	Miscellaneous Army Waste

*LSV - Liquid Scintillation Vial

NRC SOURCE: NUREG/CR-4370, Update of Part 61 Impacts Analysis Methodology, January 1986.

TABLE AP-11A: CONNECTICUT LLRW SHIPPED OFF-SITE FOR MANAGEMENT IN 1996 - BY GENERATOR, CATEGORY OF GENERATOR, AND PATH

GENERATOR	LLRW SHIPPED FROM GENERATOR DIRECTLY TO DISPOSAL FACILITIES		LLRW SHIPPED FROM GENERATOR TO BROKERS AND PROCESSORS		TOTAL LLRW SHIPPED OFF-SITE FOR MANAGEMENT	
	VOLUME (cu ft)	RADIOACTIVITY (Curies)	VOLUME (cu ft)	RADIOACTIVITY (Curies)	VOLUME (cu ft)	RADIOACTIVITY (Curies)
FUEL FABRICATION						
ABB Combustion Engineering Nuclear Products	900.0	0.037	3.8	<0.001	903.8	0.037
TOTAL FUEL FABRICATION	**900.0**	**0.037**	**3.8**	**<0.001**	**903.8**	**0.037**
INDUSTRIAL						
ABB Combustion Engineering Nuclear Services	0.0	0.000	7,797.5	0.757	7,797.5	0.757
Advanced Technology Materials, Inc.	0.0	0.000	0.4	<0.001	0.4	<0.001
Allegheny Ludlum Steel Corp.	0.0	0.000	0.4	<0.001	0.4	<0.001
AlliedSignal Engines (Textron Lycoming)	0.0	0.000	207.0	0.005	207.0	0.005
Brass Center, Ltd.	0.0	0.000	0.2	<0.001	0.2	<0.001
Hamilton Chemical	0.0	0.000	0.4	<0.001	0.4	<0.001
Hughes Danbury Optical Systems	0.0	0.000	43.8	<0.001	43.8	<0.001
Stanley Works (Laboratory)	0.0	0.000	0.4	<0.001	0.4	<0.001
United States Surgical Corporation	0.0	0.000	15.0	0.014	15.0	0.014
United Technologies Research Center	0.0	0.000	7.4	<0.001	7.4	<0.001
TOTAL INDUSTRIAL	**0.0**	**0.000**	**8,072.5**	**0.776**	**8,072.5**	**0.776**
INSTITUTIONAL						
Bridgeport Hospital	0.0	0.000	7.5	0.023	7.5	0.023
Charlotte Hungerford Hospital	0.0	0.000	0.7	0.001	0.7	0.001
Connecticut Resources Recovery Authority	0.0	0.000	4.7	<0.001	4.7	<0.001
Eastern CT State University	0.0	0.000	1.4	<0.001	1.4	<0.001
Hopkins School	0.0	0.000	0.1	<0.001	0.1	<0.001
Seymour High School	0.0	0.000	1.1	<0.001	1.1	<0.001
Stamford Public Schools	0.0	0.000	0.2	<0.001	0.2	<0.001
Univ. of CT Environ. Health & Safety	0.0	0.000	79.0	0.123	79.0	0.123
University of CT Health Center	0.0	0.000	150.0	0.050	150.0	0.050
VA Connecticut Healthcare System (V.A. Med. Ctr. Hosp.)	0.0	0.000	15.0	<0.001	15.0	<0.001
Wesleyan University	0.0	0.000	15.0	0.001	15.0	0.001
Windham Community Memorial Hospital	0.0	0.000	3.0	0.001	3.0	0.001
Yale University	0.0	0.000	1,075.9	0.402	1,075.9	0.402
TOTAL INSTITUTIONAL	**0.0**	**0.000**	**1,353.6**	**0.601**	**1,353.6**	**0.601**

TABLE AP-11A (continued)

GENERATOR	LLRW SHIPPED FROM GENERATOR DIRECTLY TO DISPOSAL FACILITIES		LLRW SHIPPED FROM GENERATOR TO BROKERS AND PROCESSORS		TOTAL LLRW SHIPPED OFF-SITE FOR MANAGEMENT	
	VOLUME (cu ft)	RADIOACTIVITY (Curies)	VOLUME (cu ft)	RADIOACTIVITY (Curies)	VOLUME (cu ft)	RADIOACTIVITY (Curies)
MILITARY						
U.S. Army Connecticut National Guard	13.1	191.014	0.0	0.000	13.1	191.014
U.S. Navy	997.5	2.002	0.0	0.000	997.5	2.002
TOTAL MILITARY	**1,010.6**	**193.016**	**0.0**	**0.000**	**1,010.6**	**193.016**
NUCLEAR POWER PLANTS						
CT Yankee Atomic Power Co.	1,323.3	1,195.494	13,500.3	57.047	14,823.6	1,252.541
Millstone 1 Northeast Nuclear Power Co.	3,027.1	1,078.817	18,151.8	2.099	21,178.9	1,080.916
Millstone 2 Northeast Nuclear Power Co.	390.2	72.119	6,637.8	3.868	7,028.0	75.987
Millstone 3 Northeast Nuclear Power Co.	994.4	498.818	3,169.8	0.494	4,164.2	499.312
TOTAL NUCLEAR POWER PLANTS	**5,735.0**	**2,845.248**	**41,459.7**	**63.508**	**47,194.7**	**2,908.756**
PRIVATE RESEARCH						
Bayer Corporation (Miles Inc.)	0.0	0.000	811.7	0.248	811.7	0.248
Boehringer Ingelheim Pharmaceuticals	0.0	0.000	42.3	0.518	42.3	0.518
Bristol-Myers Squibb	0.0	0.000	294.0	0.482	294.0	0.482
Ciba-Geigy (ICI Americas)	0.0	0.000	134.8	0.001	134.8	0.001
Cuno Inc.	0.0	0.000	7.5	0.001	7.5	0.001
Cytec Industries Inc.	0.0	0.000	<0.1	<0.001	<0.1	<0.001
Neurogen Corporation	0.0	0.000	133.0	0.013	133.0	0.013
Pfizer Inc.	0.0	0.000	1,768.2	2.058	1,768.2	2.058
Uniroyal Chemical Co.	0.0	0.000	74.5	0.018	74.5	0.018
TOTAL PRIVATE RESEARCH	**0.0**	**0.000**	**3,266.0**	**3.339**	**3,266.0**	**3.339**
TOTALS	**7,645.6**	**3,038.301**	**54,155.6**	**68.224**	**61,801.2**	**3,106.525**

TABLE AP-12A: CONNECTICUT LLRW SHIPPED OFF-SITE FOR MANAGEMENT IN 1996 - BY CATEGORY OF GENERATOR, WASTE STREAM, NRC WASTE CLASS, AND PATH

WASTE STREAM	NRC CLASS	LLRW SHIPPED FROM GENERATOR DIRECTLY TO DISPOSAL FACILITIES		LLRW SHIPPED FROM GENERATOR TO BROKERS AND PROCESSORS		TOTAL LLRW SHIPPED OFF-SITE FOR MANAGEMENT	
		VOLUME (cu ft)	RADIOACTIVITY (Curies)	VOLUME (cu ft)	RADIOACTIVITY (Curies)	VOLUME (cu ft)	RADIOACTIVITY (Curies)
FUEL FABRICATION							
F-MIXWAST	A	0.0	0.000	3.8	<0.001	3.8	<0.001
F-NCTRASH	A	900.0	0.037	0.0	0.000	900.0	0.037
TOTAL FUEL FABRICATION		**900.0**	**0.037**	**3.8**	**<0.001**	**903.8**	**0.037**
INDUSTRIAL							
N-LIQSCVL	A	0.0	0.000	7.5	<0.001	7.5	<0.001
N-LOWASTE	A	0.0	0.000	251.8	0.005	251.8	0.005
N-SOAQLQD	A	0.0	0.000	0.4	<0.001	0.4	<0.001
N=LOTRASH	A	0.0	0.000	7,812.8	0.771	7,812.8	0.771
TOTAL INDUSTRIAL		**0.0**	**0.000**	**8,072.5**	**0.776**	**8,072.5**	**0.776**
INSTITUTIONAL							
I=ABSLIQD	A	0.0	0.000	2.1	0.001	2.1	0.001
I=AQULIQD	A	0.0	0.000	4.0	<0.001	4.0	<0.001
I=BIOWAST	A	0.0	0.000	248.0	0.290	248.0	0.290
I=COTRASH	A	0.0	0.000	896.5	0.182	896.5	0.182
I=LIQSCVL	A	0.0	0.000	189.5	0.105	189.5	0.105
I=MISCSOR	A	0.0	0.000	7.5	0.023	7.5	0.023
I=NCTRASH	A	0.0	0.000	0.2	<0.001	0.2	<0.001
I=NORM	A	0.0	0.000	1.1	<0.001	1.1	<0.001
I=RAMISCL	A	0.0	0.000	4.7	<0.001	4.7	<0.001
TOTAL INSTITUTIONAL		**0.0**	**0.000**	**1,353.6**	**0.601**	**1,353.6**	**0.601**
MILITARY							
M-ARMYWST	A	2.5	0.126	0.0	0.000	2.5	0.126
M-NAVYDRY	A	771.3	1.940	0.0	0.000	771.3	1.940
M-NAVYWET	A	226.2	0.062	0.0	0.000	226.2	0.062
TOTAL MILITARY CLASS A		**1,000.0**	**2.128**	**0.0**	**0.000**	**1,000.0**	**2.128**
M-ARMYWST	B	3.0	190.880	0.0	0.000	3.0	190.880
TOTAL MILITARY CLASS B		**3.0**	**190.880**	**0.0**	**0.000**	**3.0**	**190.880**
M-ARMYWST	C	7.6	0.008	0.0	0.000	7.6	0.008
TOTAL MILITARY CLASS C		**7.6**	**0.008**	**0.0**	**0.000**	**7.6**	**0.008**
TOTAL MILITARY		**1,010.6**	**193.016**	**0.0**	**0.000**	**1,010.6**	**193.016**

TABLE AP-12A (continued)

WASTE STREAM	NRC CLASS	LLRW SHIPPED FROM GENERATOR DIRECTLY TO DISPOSAL FACILITIES		LLRW SHIPPED FROM GENERATOR TO BROKERS AND PROCESSORS		TOTAL LLRW SHIPPED OFF-SITE FOR MANAGEMENT	
		VOLUME (cu ft)	RADIOACTIVITY (Curies)	VOLUME (cu ft)	RADIOACTIVITY (Curies)	VOLUME (cu ft)	RADIOACTIVITY (Curies)
NUCLEAR POWER PLANTS							
B-COTRASH	A	95.0	1.101	13,906.0	1.531	14,001.0	2.632
B-FCARTRG	A	0.0	0.000	18.0	0.098	18.0	0.098
B-IXRESIN	A	2,134.2	202.641	0.0	0.000	2,134.2	202.641
B-NCTRASH	A	0.0	0.000	2,171.4	0.242	2,171.4	0.242
O-METDCON	A	0.0	0.000	5,568.0	0.606	5,568.0	0.606
O-MISCLNS	A	0.0	0.000	477.4	3.548	477.4	3.548
O-MIXWAST	A	0.0	0.000	119.4	0.006	119.4	0.006
P-COTRASH	A	95.0	1.314	9,153.8	1.128	9,248.8	2.442
P-FCARTRG	A	120.3	1.864	121.1	0.370	241.4	2.234
P-IXRESIN	A	493.3	37.850	995.0	0.007	1,488.3	37.857
P-NCTRASH	A	0.0	0.000	8,929.6	55.972	8,929.6	55.972
TOTAL NPP CLASS A		**2,937.8**	**244.770**	**41,459.7**	**63.508**	**44,397.5**	**308.278**
B-IXRESIN	B	773.6	873.296	0.0	0.000	773.6	873.296
P-IXRESIN	B	1,138.1	879.621	0.0	0.000	1,138.1	879.621
TOTAL NPP CLASS B		**1,911.7**	**1,752.917**	**0.0**	**0.000**	**1,911.7**	**1,752.917**
B-FCARTRG	C	24.3	1.780	0.0	0.000	24.3	1.780
P-FCARTRG	C	500.3	54.453	0.0	0.000	500.3	54.453
P-IXRESIN	C	360.9	791.328	0.0	0.000	360.9	791.328
TOTAL NPP CLASS C		**885.5**	**847.561**	**0.0**	**0.000**	**885.5**	**847.561**
TOTAL NUCLEAR POWER PLANTS		**5,735.0**	**2,845.248**	**41,459.7**	**63.508**	**47,194.7**	**2,908.756**
PRIVATE RESEARCH							
I=ABSLIQD	A	0.0	0.000	<0.1	<0.001	0.0	<0.001
I=AQULIQD	A	0.0	0.000	64.8	0.452	64.8	0.452
I=BIOWAST	A	0.0	0.000	96.3	0.023	96.3	0.023
I=COTRASH	A	0.0	0.000	1,906.5	1.725	1,906.5	1.725
I=LIQSCVL	A	0.0	0.000	977.5	0.163	977.5	0.163
I=MWORLQD	A	0.0	0.000	109.5	0.968	109.5	0.968
I=NCTRASH	A	0.0	0.000	111.4	0.008	111.4	0.008
TOTAL PRIVATE RESEARCH		**0.0**	**0.000**	**3,266.0**	**3.339**	**3,266.0**	**3.339**
TOTALS		**7,645.6**	**3,038.301**	**54,155.6**	**68.224**	**61,801.2**	**3,106.525**

TABLE AP-12B: CONNECTICUT LLRW SHIPPED TO DISPOSAL FACILITIES IN 1996 - BY CATEGORY OF GENERATOR, WASTE STREAM, NRC WASTE CLASS, AND PATH

WASTE STREAM	NRC CLASS	LLRW SHIPPED FROM GENERATOR DIRECTLY TO DISPOSAL FACILITIES		LLRW SHIPPED FROM BROKERS AND PROCESSORS TO DISPOSAL FACILITIES		TOTAL LLRW SHIPPED TO DISPOSAL FACILITIES	
		VOLUME (cu ft)	RADIOACTIVITY (Curies)	VOLUME (cu ft)	RADIOACTIVITY (Curies)	VOLUME (cu ft)	RADIOACTIVITY (Curies)
FUEL FABRICATION							
F-NCTRASH	A	900.0	0.037	0.0	0.000	900.0	0.037
TOTAL FUEL FABRICATION		**900.0**	**0.037**	**0.0**	**0.000**	**900.0**	**0.037**
INDUSTRIAL							
N-LOWASTE	A	0.0	0.000	24.7	<0.001	24.7	<0.001
N-SOAQLQD	A	0.0	0.000	0.4	<0.001	0.4	<0.001
N=LOTRASH	A	0.0	0.000	13.8	0.210	13.8	0.210
TOTAL INDUSTRIAL		**0.0**	**0.000**	**38.9**	**0.210**	**38.9**	**0.210**
INSTITUTIONAL							
I=ABSLIQD	A	0.0	0.000	1.4	<0.001	1.4	<0.001
I=BIOWAST	A	0.0	0.000	32.9	0.170	32.9	0.170
I=COTRASH	A	0.0	0.000	187.2	0.176	187.2	0.176
I=MISCSOR	A	0.0	0.000	1.2	0.023	1.2	0.023
I=NCTRASH	A	0.0	0.000	0.2	<0.001	0.2	<0.001
I=RAMISCL	A	0.0	0.000	4.1	<0.001	4.1	<0.001
TOTAL INSTITUTIONAL		**0.0**	**0.000**	**227.0**	**0.369**	**227.0**	**0.369**
MILITARY							
M-ARMYWST	A	2.5	0.126	0.0	0.000	2.5	0.126
M-NAVYDRY	A	771.3	1.940	0.0	0.000	771.3	1.940
M-NAVYWET	A	226.2	0.062	0.0	0.000	226.2	0.062
TOTAL MILITARY CLASS A		**1,000.0**	**2.128**	**0.0**	**0.000**	**1,000.0**	**2.128**
M-ARMYWST	B	3.0	190.880	0.0	0.000	3.0	190.880
TOTAL MILITARY CLASS B		**3.0**	**190.880**	**0.0**	**0.000**	**3.0**	**190.880**
M-ARMYWST	C	7.6	0.008	0.0	0.000	7.6	0.008
TOTAL MILITARY CLASS C		**7.6**	**0.008**	**0.0**	**0.000**	**7.6**	**0.008**
TOTAL MILITARY		**1,010.6**	**193.016**	**0.0**	**0.000**	**1,010.6**	**193.016**

TABLE AP-12B (continued)

WASTE STREAM	NRC CLASS	LLRW SHIPPED FROM GENERATOR DIRECTLY TO DISPOSAL FACILITIES		LLRW SHIPPED FROM BROKERS AND PROCESSORS TO DISPOSAL FACILITIES		TOTAL LLRW SHIPPED TO DISPOSAL FACILITIES	
		VOLUME (cu ft)	RADIOACTIVITY (Curies)	VOLUME (cu ft)	RADIOACTIVITY (Curies)	VOLUME (cu ft)	RADIOACTIVITY (Curies)
NUCLEAR POWER PLANTS							
B-COTRASH	A	95.0	1.101	961.0	1.700	1,056.0	2.801
B-FCARTRG	A	0.0	0.000	0.8	0.093	0.8	0.093
B-IXRESIN	A	2,134.2	202.641	0.0	0.000	2,134.2	202.641
B-NCTRASH	A	0.0	0.000	200.3	0.145	200.3	0.145
O-MISCLNS	A	0.0	0.000	18.8	0.851	18.8	0.851
P-COTRASH	A	95.0	1.314	582.1	0.680	677.1	1.994
P-FCARTRG	A	120.3	1.864	5.3	0.354	125.6	2.218
P-IXRESIN	A	493.3	37.850	1,053.0	15.207	1,546.3	53.057
P-NCTRASH	A	0.0	0.000	543.5	6.600	543.5	6.600
TOTAL NPP CLASS A		**2,937.8**	**244.770**	**3,364.8**	**25.630**	**6,302.6**	**270.400**
B-IXRESIN	B	773.6	873.296	0.0	0.000	773.6	873.296
P-IXRESIN	B	1,138.1	879.621	0.0	0.000	1,138.1	879.621
TOTAL NPP CLASS B		**1,911.7**	**1,752.917**	**0.0**	**0.000**	**1,911.7**	**1,752.917**
B-FCARTRG	C	24.3	1.780	0.0	0.000	24.3	1.780
O-MISCLNS	C	0.0	0.000	190.2	20.480	190.2	20.480
P-FCARTRG	C	500.3	54.453	0.0	0.000	500.3	54.453
P-IXRESIN	C	360.9	791.328	0.0	0.000	360.9	791.328
TOTAL NPP CLASS C		**885.5**	**847.561**	**190.2**	**20.480**	**1,075.7**	**868.041**
TOTAL NUCLEAR POWER PLANTS		**5,735.0**	**2,845.248**	**3,555.0**	**46.110**	**9,290.0**	**2,891.358**
PRIVATE RESEARCH							
I=ABSLIQD	A	0.0	0.000	<0.1	<0.001	<0.1	<0.001
I=AQULIQD	A	0.0	0.000	46.4	0.536	46.4	0.536
I=BIOWAST	A	0.0	0.000	7.5	<0.001	7.5	<0.001
I=COTRASH	A	0.0	0.000	245.4	2.396	245.4	2.396
I=NCTRASH	A	0.0	0.000	4.1	0.003	4.1	0.003
TOTAL PRIVATE RESEARCH		**0.0**	**0.000**	**303.4**	**2.935**	**303.4**	**2.935**
TOTALS		**7,645.6**	**3,038.301**	**4,124.3**	**49.624**	**11,769.9**	**3,087.925**

TABLE AP-13: LLRW BROKERS AND PROCESSORS (INTERMEDIATES) USED BY CONNECTICUT GENERATORS IN 1996 - BY CATEGORY OF GENERATOR

INTERMEDIATES *	VOLUME SHIPPED TO INTERMEDIATES (cu ft)	TOTAL VOLUME SHIPPED OFF-SITE BY GENERATOR CATEGORY (cu ft)	VOLUME PERCENT OF CATEGORY TOTAL SHIPPED TO INTERMEDIATES
FUEL FABRICATION			
NSSI	3.8		
TOTAL FUEL FABRICATION	**3.8**	**903.8**	**0.4%**
INDUSTRIAL			
NDL	1.6		
NDL / SEG	0.2		
Radiac	7.5		
Radiac / Perma-Fix	7.5		
SEG	7,804.9		
Teledyne / SEG	43.8		
U.S. Ecology	207.0		
TOTAL INDUSTRIAL	**8,072.5**	**8,072.5**	**100.0%**
INSTITUTIONAL			
ADCO	7.5		
NDL	3.9		
Radiac / Perma-Fix	92.0		
Radiac / SEG	4.7		
SEG	985.0		
Teledyne	0.1		
Teledyne / SEG	30.0		
U.S. Ecology	1.4		
U.S. Ecology / American Ecology	131.5		
U.S. Ecology / Perma-Fix	97.5		
TOTAL INSTITUTIONAL	**1,353.6**	**1,353.6**	**100.0%**
MILITARY	0.0		
TOTAL MILITARY	**0.0**	**1,010.6**	**0.0%**
NUCLEAR POWER PLANTS			
American Ecology	6.5		
American Ecology / HAKE	8,180.0		
American Ecology / SEG	5,313.8		
DSSI	119.4		
HAKE	3,200.0		
HAKE / MSC	2,368.0		
SEG	19,934.4		
SEG / MSC	2,337.6		
TOTAL NUCLEAR POWER PLANTS	**41,459.7**	**47,194.7**	**87.9%**
PRIVATE RESEARCH			
DSSI	0.3		
NDL	23.9		
NDL / SEG	192.9		
NSSI	232.2		
Perma-Fix	854.5		
SEG	1,962.2		
Teledyne / SEG	<0.1		
TOTAL PRIVATE RESEARCH	**3,266.0**	**3,266.0**	**100.0%**
TOTALS	**54,155.6**	**61,801.2**	**87.6%** †

TABLE AP-13 (continued)

• BROKERS USED BY CONNECTICUT LLRW GENERATORS

NDL = NDL Organization, Peekskill, NY
Radiac = Radiac Research Corporation, Brooklyn, NY
Teledyne = Teledyne Isotopes, Inc., Westwood, NJ
U.S. Ecology = U.S. Ecology, Oak Ridge, TN

PROCESSORS USED BY CONNECTICUT LLRW GENERATORS

ADCO = ADCO Services, Inc., Tinley Park, IL
American Ecology = American Ecology, Oak Ridge, TN
Chem-Nuclear = Chem-Nuclear Systems, Inc., Barnwell, SC
DSSI = Diversified Scientific Services, Inc., Kingston, TN
Hake = F. W. Hake Company, Memphis, TN
MSC = Manufacturing Sciences Corp., Oak Ridge, TN
NSSI = NSSI/Recovery Services, Inc., Houston, TX
Perma-Fix = Perma-Fix of Florida, Inc., Gainesville, FL
SEG = Scientific Ecology Group, Oak Ridge, TN
U.S. Ecology = U.S. Ecology, Oak Ridge, TN

† The total volume shipped to brokers and processors in 1996 (54,155.6 cu ft) is 87.6% of the total volume shipped off-site (61,801.2 cu ft).

TABLE AP-14: INTERMEDIATES AND PROCESSING METHODS USED BY CONNECTICUT GENERATORS IN 1996- BY CATEGORY OF GENERATOR AND BROKER / PROCESSOR PATHWAY

LLRW BROKERS AND/OR PROCESSORS *	PROCESSING METHOD	GENERATOR TO BROKER AND/OR PROCESSOR (cu ft)	GENERATOR TO BROKER AND/OR PROCESSOR (Curies)	BROKER OR PROCESSOR TO DISPOSAL FACILITIES (cu ft)	BROKER OR PROCESSOR TO DISPOSAL FACILITIES (Curies)	PERCENT REDUCTION OF VOLUME
FUEL FABRICATION						
NSSI	Absorption of Liquids	3.8	<0.001	0.0	0.000	
TOTAL FUEL FABRICATION		**3.8**	**<0.001**	**0.0**	**0.000**	**0.0% †**
INDUSTRIAL						
NDL	(No off-site processing)	1.6	<0.001	1.4	<0.001	
NDL / SEG	(No off-site processing)	0.2	<0.001	0.2	<0.001	
Radiac / Perma-Fix	Incineration	7.5	<0.001	0.0	0.000	
Radiac / SEG	Supercompaction	7.5	0.014	1.4	0.014	
SEG	Compaction, Supercomp., Incin., Metal Melt, Decontamination	7,804.9	0.757	12.0	0.196	
Teledyne / SEG	Supercompaction	43.8	<0.001	18.3	<0.001	
U.S. Ecology	Supercompaction	207.0	0.005	5.6	<0.001	
TOTAL INDUSTRIAL		**8,072.5**	**0.776**	**38.9**	**0.210**	**99.5%**
INSTITUTIONAL						
ADCO	Compaction	7.5	0.023	1.2	0.023	
American Ecology	(No off-site processing)	0.0	0.000	22.5	0.014 ‡	
NDL	(No off-site processing)	3.9	0.002	0.2	<0.001	
Radiac / Perma-Fix	Incineration	92.0	0.101	0.0	0.000	
Radiac / SEG	Compaction	4.7	<0.001	4.1	<0.001	
SEG	Compaction, Supercomp., Incin., Steam Reformation	985.0	0.301	87.0	0.186	
Teledyne	(No off-site processing)	0.1	<0.001	0.1	<0.001	
Teledyne / SEG	Supercompaction	30.0	0.001	5.3	0.001	
U.S. Ecology	(No off-site processing)	1.4	<0.001	1.4	<0.001	
U.S. Ecology / American Ecology	Incineration, Supercompaction	131.5	0.169	105.2	0.145	
U.S. Ecology / Perma-Fix	Incineration	97.5	0.004	0.0	0.000	
TOTAL INSTITUTIONAL		**1,353.6**	**0.601**	**227.0**	**0.369**	**83.3%**
MILITARY		0.0	0.000	0.0	0.000	
TOTAL MILITARY		**0.0**	**0.000**	**0.0**	**0.000**	**0.0%**
NUCLEAR POWER PLANTS						
American Ecology	Placement Packaging	6.5	4.903	0.0	0.000	
American Ecology / HAKE	Supercompaction, Metal Melt, Decontamination	8,180.0	51.052	0.0	0.000	
American Ecology / SEG	Incineration, Supercompaction, Metal Melt	5,313.8	1.092	233.8	0.537	
DSSI	Incineration	119.4	0.006	0.0	0.000	
HAKE	Decontamination	3,200.0	0.408	0.0	0.000	
HAKE / MSC	Decontamination	2,368.0	0.198	0.0	0.000	
SEG	Incin., Supercomp., Decon., Met. Melt, Pl. Pkg., Seal in Asphalt	19,934.4	5.603	2,642.0	38.838	
SEG / MSC	Incineration, Supercompaction, Decontamination, Metal Melt	2,337.6	0.246	679.2	6.735	
TOTAL NUCLEAR POWER PLANTS		**41,459.7**	**63.508**	**3,555.0**	**46.110**	**91.4%**

TABLE AP-14 (continued)

LLRW BROKERS AND/OR PROCESSORS *	PROCESSING METHOD	GENERATOR TO BROKER AND/OR PROCESSOR (cu ft)	GENERATOR TO BROKER AND/OR PROCESSOR (Curies)	BROKER OR PROCESSOR TO DISPOSAL FACILITIES (cu ft)	BROKER OR PROCESSOR TO DISPOSAL FACILITIES (Curies)	PERCENT REDUCTION OF VOLUME
PRIVATE RESEARCH						
DSSI	Incineration	0.3	0.129	0.0	0.000	
NDL	(No off-site processing)	23.9	0.009	4.1	0.003	
NDL / SEG	Metal Melt	192.9	0.011	9.2	0.001	
NSSI	Incineration	232.2	0.872	0.0	0.000	
Perma-Fix	Incineration	854.5	0.131	0.0	0.000	
SEG	Incin., Comp., Supercomp., Steam Reform., Solidification	1,962.2	2.187	290.1	2.931	
Teledyne / SEG	(No off-site processing)	<0.1	<0.001	<0.1	<0.001	
TOTAL PRIVATE RESEARCH		**3,266.0**	**3.339**	**303.4**	**2.935**	**90.7%**
TOTALS		**54,155.6**	**68.224**	**4,124.3**	**49.624**	**92.4%**

* See Table AP-13 for identification of brokers and processors.

For greater detail on processors and processing methods offered, please consult: National LLRW Management Program, DOE/LLW-240, "Commercially Available Low-Level Radioactive and Mixed Waste Treatment Technologies" (October 1996).

† Waste held by processor at end of 1996.

‡ Waste shipped off-site in 1995; disposed in 1996.

TABLE AP-15: DISPOSAL FACILITIES USED BY CONNECTICUT GENERATORS IN 1996 - BY CATEGORY OF GENERATOR

CATEGORY OF GENERATOR	BARNWELL, SC VOLUME (cu ft)	BARNWELL, SC RADIOACTIVITY (Curies)	ENVIROCARE, CLIVE, UT VOLUME (cu ft)	ENVIROCARE, CLIVE, UT RADIOACTIVITY (Curies)
FUEL FABRICATION			900.0	0.037
INDUSTRIAL	38.9	0.210		
INSTITUTIONAL	227.0	0.369		
MILITARY	1,010.6	193.016		
NUCLEAR POWER PLANTS	9,290.0	2,891.358		
PRIVATE RESEARCH	303.4	2.935		
TOTALS	**10,869.9**	**3,087.888**	**900.0**	**0.037**

Grand Total Disposed: 11,769.9 cubic feet
3,087.925 Curies

FIGURE AP-2: DISPOSAL FACILITIES USED BY CONNECTICUT GENERATORS IN 1996

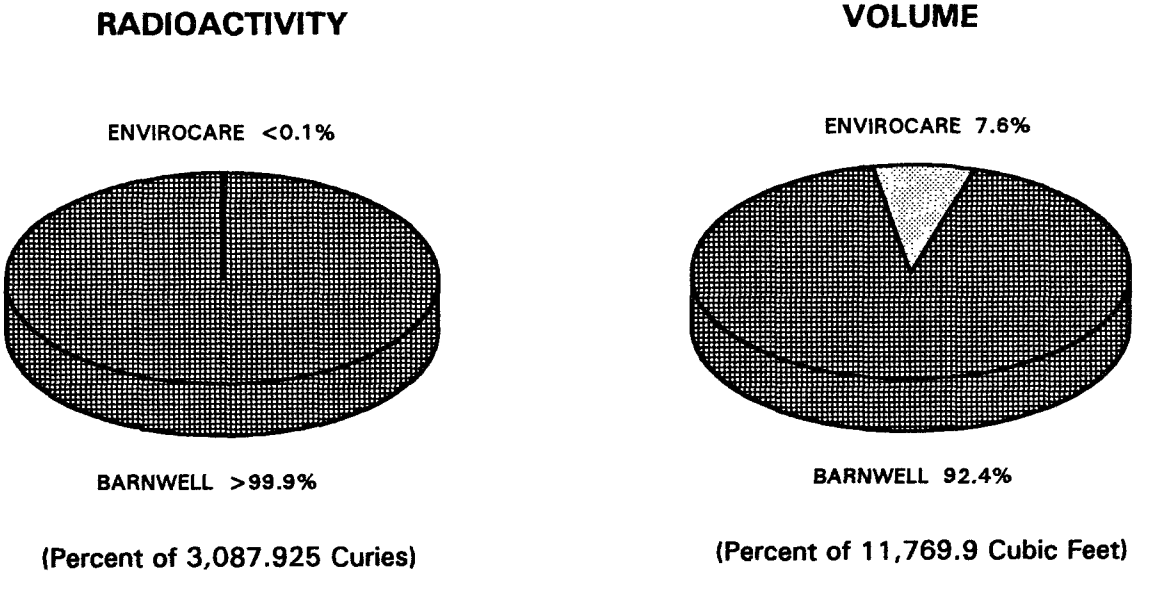


TABLE AP-16: CONNECTICUT LLRW SHIPPED TO DISPOSAL FACILITIES IN 1996 - BY NRC CLASS AND GENERATOR

GENERATOR	NRC CLASS	VOLUME (cu ft)	RADIOACTIVITY (Curies)
ABB Combustion Engineering Nuclear Products	A	900.0	0.037
ABB Combustion Engineering Nuclear Services	A	12.0	0.196
Advanced Technology Materials, Inc.	A	0.2	<0.001
Allegheny Ludlum Steel Corp.	A	0.4	<0.001
AlliedSignal Engines (Textron Lycoming)	A	5.6	<0.001
Bayer Corporation (Miles Inc.)	A	167.8	0.255
Boehringer Ingelheim Pharmaceuticals	A	63.9	1.036
Brass Center, Ltd.	A	0.2	<0.001
Bridgeport Hospital	A	1.2	0.023
Bristol-Myers Squibb	A	1.4	0.177
CT Yankee Atomic Power Co.	A	715.0	25.005
Ciba-Geigy (ICI Americas)	A	9.2	0.001
Connecticut Resources Recovery Authority	A	4.1	<0.001
Cytec Industries Inc.	A	<0.1	<0.001
Eastern CT State University	A	1.4	<0.001
Hamilton Chemical	A	0.4	<0.001
Hopkins School	A	0.1	<0.001
Hughes Danbury Optical Systems	A	18.3	<0.001
Millstone 1 Northeast Nuclear Power Co.	A	3,391.3	205.680
Millstone 2 Northeast Nuclear Power Co.	A	1,071.0	2.368
Millstone 3 Northeast Nuclear Power Co.	A	1,125.3	37.347
Neurogen Corporation	A	23.0	0.010
Pfizer Inc.	A	34.0	1.453
Stamford Public Schools	A	0.2	<0.001
Stanley Works (Laboratory)	A	0.4	<0.001
U.S. Army Connecticut National Guard	A	2.5	0.126
U.S. Navy	A	997.5	2.002
Uniroyal Chemical Co.	A	4.1	0.003
United States Surgical Corporation	A	1.4	0.014
Univ. of CT Environ. Health & Safety	A	35.2	0.049
University of CT Health Center	A	92.5	0.110
Wesleyan University	A	5.3	0.001
Yale University	A	46.1	0.181
Yale-New Haven Hospital	A	40.9	0.005
TOTAL CLASS A		**8,771.9**	**276.079**
CT Yankee Atomic Power Co.	B	360.9	369.078
Millstone 1 Northeast Nuclear Power Co.	B	773.6	873.296
Millstone 2 Northeast Nuclear Power Co.	B	240.6	66.819
Millstone 3 Northeast Nuclear Power Co.	B	536.6	443.724
U.S. Army Connecticut National Guard	B	3.0	190.880
TOTAL CLASS B		**1,914.7**	**1,943.797**
CT Yankee Atomic Power Co.	C	481.2	801.948
Millstone 1 Northeast Nuclear Power Co.	C	99.9	17.580
Millstone 2 Northeast Nuclear Power Co.	C	54.6	3.985
Millstone 3 Northeast Nuclear Power Co.	C	440.0	44.528
U.S. Army Connecticut National Guard	C	7.6	0.008
TOTAL CLASS C		**1,083.3**	**868.049**
TOTALS		**11,769.9**	**3,087.925**

TABLE AP-17: CONNECTICUT LLRW SHIPPED TO DISPOSAL FACILITIES IN 1996 - BY NRC WASTE CLASS

	RADIOACTIVITY		VOLUME	
NRC WASTE CLASS	Curies	%	cu ft	%
CLASS A	276.079	8.9	8,771.9	74.5
CLASS B	1,943.797	63.0	1,914.7	16.3
CLASS C	868.049	28.1	1,083.3	9.2
TOTALS	**3,087.925**	**100.0%**	**11,769.9**	**100.0%**

FIGURE AP-3: CONNECTICUT LLRW SHIPPED TO DISPOSAL FACILITIES IN 1996 - BY NRC WASTE CLASS

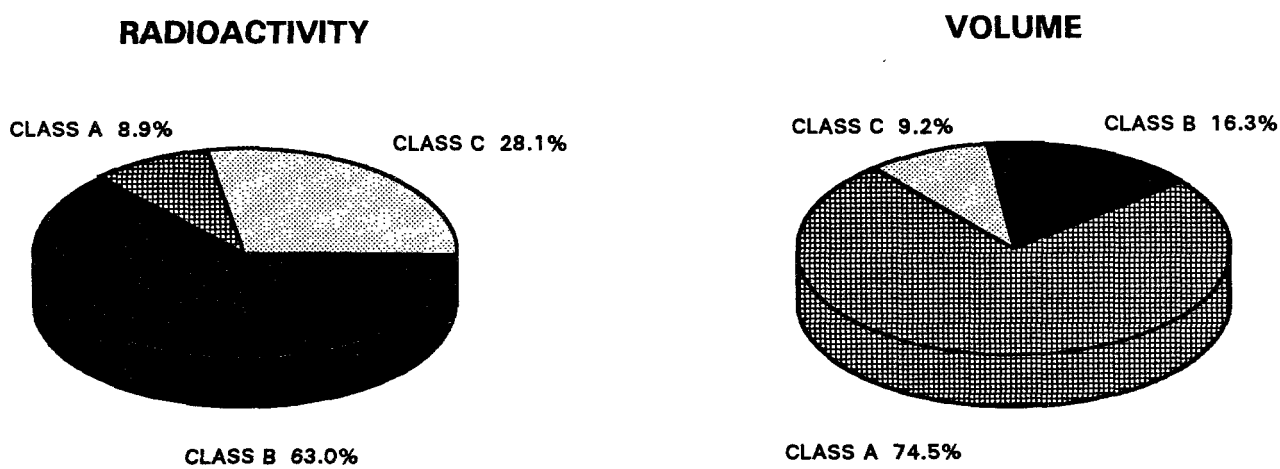


TABLE AP-17A: AVERAGE COMPOSITION OF LLRW SHIPPED TO DISPOSAL FACILITIES BY CONNECTICUT GENERATORS IN 1987 THROUGH 1996 - BY NRC WASTE CLASS

	RADIOACTIVITY		VOLUME	
NRC WASTE CLASS	Curies	%	cu ft	%
CLASS A	9,424	2.1	326,227	93.5
CLASS B	10,014	2.3	12,906	3.7
CLASS C	421,070	95.6	9,813	2.8
TOTALS	**440,508**	**100.0%**	**348,946**	**100.0%**

FIGURE AP-3A: AVERAGE COMPOSITION OF LLRW SHIPPED TO DISPOSAL FACILITIES BY CONNECTICUT GENERATORS IN 1987 THROUGH 1996 - BY NRC WASTE CLASS

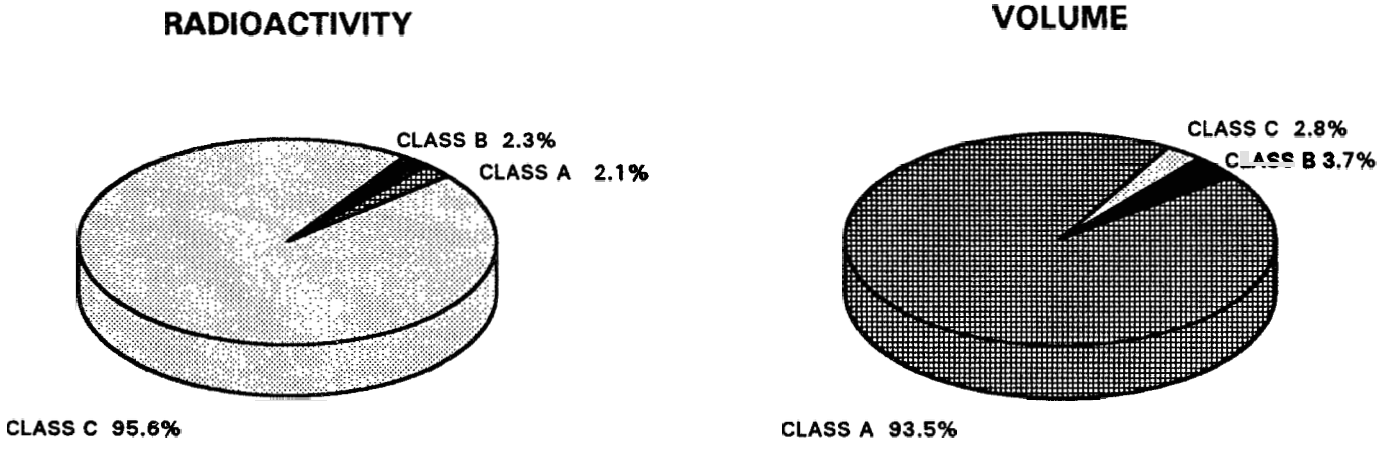


TABLE AP-18: THE RADIONUCLIDES, HALF-LIVES, AND RADIOACTIVITY IN LLRW SHIPPED OFF-SITE FOR MANAGEMENT FROM CONNECTICUT IN 1996 - BY CATEGORY OF GENERATOR

ALL HALF-LIVES

RADIONUCLIDE		HALF-LIFE (YEARS*)	RADIOACTIVITY (CURIES)						
			FUEL FABRICATION	INDUSTRIAL	INSTITUTIONAL	MILITARY	NUCLEAR POWER PLANTS	PRIVATE RESEARCH	TOTAL
H-3	Tritium	12.3		0.001	0.334	190.894	10.897	1.469	203.595
C-14	Carbon	5,715		0.013	0.069	0.013	1.817	1.244	3.156
NA-22	Sodium	2.6			0.001				0.001
AL-26	Aluminum	710,000			<0.001				<0.001
P-32	Phosphorus	0.04			0.017			0.081	0.098
P-33	Phosphorus	0.07			<0.001			0.055	0.055
S-35	Sulfur	0.24			0.058			0.351	0.409
CL-36	Chlorine	301,000			0.001				0.001
CA-45	Calcium	0.45			0.069			0.071	0.140
SC-46	Scandium	0.23			0.001				0.001
CR-51	Chromium	0.08			0.007		0.007	0.008	0.022
MN-54	Manganese	0.86		0.021	<0.001	0.044	163.737		163.802
FE-55	Iron	2.7		0.022	0.002	0.885	447.672		448.581
FE-59	Iron	0.12					<0.001		<0.001
CO-57	Cobalt	0.74			0.001		1.217		1.218
CO-58	Cobalt	0.19		0.051		0.089	63.766		63.906
CO-60	Cobalt	5.3		0.551	<0.001	0.885	282.425		283.861
NI-59	Nickel	76,000					0.002		0.002
NI-63	Nickel	100.0		0.001	<0.001	0.071	249.129		249.201
ZN-65	Zinc	0.67			<0.001		693.403		693.403
KR-85	Krypton	10.7		<0.001		0.005			0.005
RB-86	Rubidium	0.05			<0.001			0.009	0.009
SR-89	Strontium	0.14			0.002		0.047		0.049
SR-90	Strontium	29.1		0.001	0.022	<0.001	1.438		1.461
ZR-95	Zirconium	0.18		0.063			<0.001		0.063
NB-94	Niobium	24,000				<0.001	<0.001		<0.001
NB-95	Niobium	0.10			0.001		0.003		0.004
TC-99	Technetium	213,000				<0.001	0.012		0.012
RU-103	Ruthenium	0.11			<0.001		<0.001		<0.001
AG-110M	Silver	0.68					4.004		4.004
CD-109	Cadmium	1.3			<0.001				<0.001
SN-113	Tin	0.32			0.002		0.036		0.038
SB-122	Antimony	0.007					<0.001		<0.001
SB-124	Antimony	0.16				<0.001	<0.001		<0.001
SB-125	Antimony	2.8		0.038	<0.001		1.989		2.027
I-125	Iodine	0.16			0.013			0.050	0.063
I-129	Iodine	17,000,000				<0.001	0.079		0.079
I-131	Iodine	0.02						0.001	0.001
CS-134	Cesium	2.1			<0.001		268.023		268.023
CS-137	Cesium	30.2		0.008	<0.001	<0.001	717.328		717.336
BA-133	Barium	10.5			<0.001				<0.001
CE-144	Cerium	0.78					<0.001		<0.001
PM-147	Promethium	2.6				0.126			0.126

TABLE AP-18 (continued)

RADIONUCLIDE		HALF-LIFE (YEARS*)	RADIOACTIVITY (CURIES) FUEL FABRICATION	INDUSTRIAL	INSTITUTIONAL	MILITARY	NUCLEAR POWER PLANTS	PRIVATE RESEARCH	TOTAL
GD-153	Gadolinium	0.66		<0.001					<0.001
HF-181	Hafnium	0.12					<0.001		<0.001
TA-182	Tantalum	0.31					<0.001		<0.001
RE-187	Rhenium	44,000,000,000				<0.001			<0.001
PO-210	Polonium	0.38			<0.001				<0.001
RA-226	Radium	1,599			<0.001	0.003	<0.001		0.003
TH-228	Thorium	1.9					<0.001		<0.001
TH-232	Thorium	14,000,000,000		0.005	<0.001	<0.001		<0.001	0.005
TH-234	Thorium	0.07					<0.001		<0.001
U-234	Uranium	245,000	0.028						0.028
U-235	Uranium	704,000,000	0.001	<0.001	<0.001				0.001
U-238	Uranium	4,460,000,000	0.008	<0.001	<0.001			<0.001	0.008
NP-237	Neptunium	2,140,000					<0.001		<0.001
PU-238	Plutonium	87.7					0.045		0.045
PU-239	Plutonium	24,110					0.014		0.014
PU-240	Plutonium	6,537					0.005		0.005
PU-241	Plutonium	14.4					1.564		1.564
PU-242	Plutonium	376,000					<0.001		<0.001
AM-241	Americium	432.2		<0.001			0.048		0.048
CM-242	Curium	0.45		<0.001			0.010		0.010
CM-243	Curium	28.5					0.005		0.005
CM-244	Curium	18.1		<0.001			0.037		0.037
Unspecified Radionuclides									0.000
TOTAL									3,106.525

NOTES FOR TABLES AP-18, AP-18A, AND AP-18B

*Source of Half-Lives: Handbook of Chemistry and Physics, (76th Edition, 1995-1996), CRC Press, Inc.

The amounts of I-129 and Tc-99 listed in the Tables as attributable to nuclear power plants are the amounts reported by the nuclear power plant operators. As part of the process of preparing LLRW projections, the CHWMS has had Vance & Associates, Inc. analyze I-129 and Tc-99 quantities through the use of a computer model. For the purpose of projections, this analysis should more accurately determine the quantities of these two radionuclides produced by the nuclear power plants.

TABLE AP-18A: THE RADIONUCLIDES, HALF-LIVES, AND RADIOACTIVITY IN LLRW SHIPPED OFF-SITE FOR MANAGEMENT FROM CONNECTICUT IN 1996 - BY CATEGORY OF GENERATOR

HALF-LIVES LONGER THAN 5 YEARS

RADIONUCLIDE		HALF-LIFE (YEARS*)	RADIOACTIVITY (CURIES)						
			FUEL FABRICATION	INDUSTRIAL	INSTITUTIONAL	MILITARY	NUCLEAR POWER PLANTS	PRIVATE RESEARCH	TOTAL
RE-187	Rhenium	44,000,000,000				<0.001			<0.001
TH-232	Thorium	14,000,000,000		0.005	<0.001	<0.001		<0.001	0.005
U-238	Uranium	4,460,000,000	0.008	<0.001	<0.001			<0.001	0.008
U-235	Uranium	704,000,000	0.001	<0.001	<0.001				0.001
I-129	Iodine	17,000,000				<0.001	0.079		0.079
NP-237	Neptunium	2,140,000					<0.001		<0.001
AL-26	Aluminum	710,000			<0.001				<0.001
PU-242	Plutonium	376,000					<0.001		<0.001
CL-36	Chlorine	301,000			0.001				0.001
U-234	Uranium	245,000	0.028						0.028
TC-99	Technetium	213,000				<0.001	0.012		0.012
NI-59	Nickel	76,000					0.002		0.002
PU-239	Plutonium	24,110					0.014		0.014
NB-94	Niobium	24,000				<0.001	<0.001		<0.001
PU-240	Plutonium	6,537					0.005		0.005
C-14	Carbon	5,715		0.013	0.069	0.013	1.817	1.244	3.156
RA-226	Radium	1,599			<0.001	0.003	<0.001		0.003
AM-241	Americium	432.2		<0.001			0.048		0.048
NI-63	Nickel	100.0		0.001	<0.001	0.071	249.129		249.201
PU-238	Plutonium	87.7					0.045		0.045
CS-137	Cesium	30.2		0.008	<0.001	<0.001	717.328		717.336
SR-90	Strontium	29.1		0.001	0.022	<0.001	1.438		1.461
CM-243	Curium	28.5					0.005		0.005
CM-244	Curium	18.1		<0.001			0.037		0.037
PU-241	Plutonium	14.4					1.564		1.564
H-3	Tritium	12.3		0.001	0.334	190.894	10.897	1.469	203.595
KR-85	Krypton	10.7		<0.001		0.005			0.005
BA-133	Barium	10.5			<0.001				<0.001
CO-60	Cobalt	5.3		0.551	<0.001	0.885	282.425		283.861
TOTAL									1,460.472

TABLE AP-18B: THE RADIONUCLIDES, HALF-LIVES, AND RADIOACTIVITY IN LLRW SHIPPED OFF-SITE FOR MANAGEMENT FROM CONNECTICUT IN 1996 - BY CATEGORY OF GENERATOR

HALF-LIVES SHORTER THAN 5 YEARS

RADIONUCLIDE		HALF-LIFE (YEARS*)	RADIOACTIVITY (CURIES)						
			FUEL FABRICATION	INDUSTRIAL	INSTITUTIONAL	MILITARY	NUCLEAR POWER PLANTS	PRIVATE RESEARCH	TOTAL
SB-125	Antimony	2.8		0.038	<0.001		1.989		2.027
FE-55	Iron	2.7		0.022	0.002	0.885	447.672		448.581
PM-147	Promethium	2.6				0.126			0.126
NA-22	Sodium	2.6			0.001				0.001
CS-134	Cesium	2.1			<0.001		268.023		268.023
TH-228	Thorium	1.9					<0.001		<0.001
CD-109	Cadmium	1.3			<0.001				<0.001
MN-54	Manganese	0.86		0.021	<0.001	0.044	163.737		163.802
CE-144	Cerium	0.78					<0.001		<0.001
CO-57	Cobalt	0.74			0.001		1.217		1.218
AG-110M	Silver	0.68					4.004		4.004
ZN-65	Zinc	0.67			<0.001		693.403		693.403
GD-153	Gadolinium	0.66		<0.001					<0.001
CA-45	Calcium	0.45			0.069			0.071	0.140
CM-242	Curium	0.45		<0.001			0.010		0.010
PO-210	Polonium	0.38			<0.001				<0.001
SN-113	Tin	0.32			0.002		0.036		0.038
TA-182	Tantalum	0.31					<0.001		<0.001
S-35	Sulfur	0.24			0.058			0.351	0.409
SC-46	Scandium	0.23			0.001				0.001
CO-58	Cobalt	0.19		0.051		0.089	63.766		63.906
ZR-95	Zirconium	0.18		0.063			<0.001		0.063
I-125	Iodine	0.16			0.013			0.050	0.063
SB-124	Antimony	0.16				<0.001	<0.001		<0.001
SR-89	Strontium	0.14			0.002		0.047		0.049
HF-181	Hafnium	0.12					<0.001		<0.001
FE-59	Iron	0.12					<0.001		<0.001
RU-103	Ruthenium	0.11			<0.001		<0.001		<0.001
NB-95	Niobium	0.10			0.001		0.003		0.004
CR-51	Chromium	0.08			0.007		0.007	0.008	0.022
TH-234	Thorium	0.07					<0.001		<0.001
P-33	Phosphorus	0.07			<0.001			0.055	0.055
RB-86	Rubidium	0.05			<0.001			0.009	0.009
P-32	Phosphorus	0.04			0.017			0.081	0.098
I-131	Iodine	0.02						0.001	0.001
SB-122	Antimony	0.007					<0.001		<0.001
Unspecified Radionuclides									0.000
TOTAL									1,646.053

TABLE AP-19: THE RADIONUCLIDES, HALF-LIVES, AND RADIOACTIVITY IN LLRW SHIPPED OFF-SITE FOR MANAGEMENT BY CONNECTICUT NUCLEAR POWER PLANTS IN 1996 - BY NRC CLASS

ALL HALF-LIVES

RADIONUCLIDE		HALF-LIFE (YEARS*)	RADIOACTIVITY (CURIES) CLASS A	CLASS B	CLASS C	TOTAL
H-3	Tritium	12.3	10.284	0.297	0.316	10.897
C-14	Carbon	5,715	0.686	0.579	0.552	1.817
NA-22	Sodium	2.6				
AL-26	Aluminum	710,000				
P-32	Phosphorus	0.04				
P-33	Phosphorus	0.07				
S-35	Sulfur	0.24				
CL-36	Chlorine	301,000				
CA-45	Calcium	0.45				
SC-46	Scandium	0.23				
CR-51	Chromium	0.08	0.005		0.002	0.007
MN-54	Manganese	0.86	6.214	140.934	16.589	163.737
FE-55	Iron	2.7	127.887	162.924	156.861	447.672
FE-59	Iron	0.12			<0.001	<0.001
CO-57	Cobalt	0.74	0.036	1.166	0.015	1.217
CO-58	Cobalt	0.19	10.402	47.722	5.642	63.766
CO-60	Cobalt	5.3	38.418	170.290	73.717	282.425
NI-59	Nickel	76,000	0.002			0.002
NI-63	Nickel	100.0	13.170	204.634	31.325	249.129
ZN-65	Zinc	0.67	40.602	652.720	0.081	693.403
KR-85	Krypton	10.7				
RB-86	Rubidium	0.05				
SR-89	Strontium	0.14	0.001	0.046	<0.001	0.047
SR-90	Strontium	29.1	0.154	0.699	0.585	1.438
ZR-95	Zirconium	0.18			<0.001	<0.001
NB-94	Niobium	24,000	<0.001			<0.001
NB-95	Niobium	0.10	0.003			0.003
TC-99	Technetium	213,000	0.010	0.002	<0.001	0.012
RU-103	Ruthenium	0.11			<0.001	<0.001
AG-110M	Silver	0.68	0.095	3.855	0.054	4.004
CD-109	Cadmium	1.3				
SN-113	Tin	0.32		0.034	0.002	0.036
SB-122	Antimony	0.007		<0.001		<0.001
SB-124	Antimony	0.16			<0.001	<0.001
SB-125	Antimony	2.8	0.248	1.530	0.211	1.989
I-125	Iodine	0.16				
I-129	Iodine	17,000,000	0.079	<0.001	<0.001	0.079
I-131	Iodine	0.02				
CS-134	Cesium	2.1	14.147	99.448	154.428	268.023
CS-137	Cesium	30.2	45.171	265.555	406.602	717.328

TABLE AP-19 (continued)

RADIONUCLIDE		HALF-LIFE (YEARS*)	RADIOACTIVITY (CURIES) CLASS A	CLASS B	CLASS C	TOTAL
BA-133	Barium	10.5				
CE-144	Cerium	0.78			<0.001	<0.001
PM-147	Promethium	2.6				
GD-153	Gadolinium	0.66				
HF-181	Hafnium	0.12	<0.001		<0.001	<0.001
TA-182	Tantalum	0.31	<0.001			<0.001
RE-187	Rhenium	44,000,000,000				
PO-210	Polonium	0.38				
RA-226	Radium	1,599	<0.001			<0.001
TH-228	Thorium	1.9	<0.001			<0.001
TH-232	Thorium	14,000,000,000				
TH-234	Thorium	0.07	<0.001			<0.001
U-234	Uranium	245,000				
U-235	Uranium	704,000,000				
U-238	Uranium	4,460,000,000				
NP-237	Neptunium	2,140,000	<0.001		<0.001	<0.001
PU-238	Plutonium	87.7	0.016	0.012	0.017	0.045
PU-239	Plutonium	24,110	0.006	0.005	0.003	0.014
PU-240	Plutonium	6,537	0.001	0.001	0.003	0.005
PU-241	Plutonium	14.4	0.591	0.435	0.538	1.564
PU-242	Plutonium	376,000	<0.001	<0.001	<0.001	<0.001
AM-241	Americium	432.2	0.026	0.015	0.007	0.048
CM-242	Curium	0.45	0.001	0.003	0.006	0.010
CM-243	Curium	28.5	0.002	0.001	0.002	0.005
CM-244	Curium	18.1	0.024	0.010	0.003	0.037
Unspecified Radionuclides						
TOTAL						2,908.759 **

NOTES FOR TABLE AP-19

*Source of Half-Lives: Handbook of Chemistry and Physics, (76th Edition, 1995-1996), CRC Press, Inc.

**The 0.003 Ci difference between this number and the number previously reported as the total activity shipped off-site for management by nuclear power plants (2,908.756 Ci) is believed to be attributable to minor unreconciled rounding effects in compiling generator data, as well as to the abundance of values <0.001 shown on Table AP-19.

The amounts of I-129 and Tc-99 listed in the Tables as attributable to nuclear power plants are the amounts reported by the nuclear power plant operators. As part of the process of preparing LLRW projections, the CHWMS has had Vance & Associates, Inc. analyze I-129 and Tc-99 quantities through the use of a computer model. For the purpose of projections, this analysis should more accurately determine the quantities of these two radionuclides produced by the nuclear power plants.

TABLE AP-20A: RADIONUCLIDE CONCENTRATIONS IN WASTE STREAMS SHIPPED OFF-SITE FOR MANAGEMENT FROM CONNECTICUT IN 1996 - NUCLEAR POWER PLANTS
(Millicuries per cubic foot)

RADIONUCLIDE	B-COTRASH	B-FCARTRG	B-IXRESIN	B-NCTRASH	O-METDECON	O-MISCLNS	O-MIXWAST	P-COTRASH	P-FCARTRG	P-IXRESIN	P-NCTRASH
H-3	0.000023	0.096217	0.023867	0.000344	0.000114	0.001083	0.048325	0.022473	0.050577	0.285847	1.088092
C-14	0.000003	0.055272	0.055162		0.000272	0.256762		0.002423	0.138727	0.346660	0.041305
NA-22											
CL-36											
FE-55	0.149989	28.200946	53.026687	0.088883	0.059088	0.630499	0.000010	0.028297	46.494270	83.626887	0.537498
CO-60	0.016285	8.780142	28.200014	0.009625	0.012123	1.631158	0.000003	0.035543	11.414318	82.653542	0.335845
NI-59				0.001073							
NI-63	0.001764	4.929078	4.783685		0.007220	4.479975	0.000001	0.023166	7.134583	75.834198	0.085253
SR-90		0.006519	0.059323			0.001799		0.000141	0.003330	0.401625	0.006814
NB-94						<0.000001					
TC-99[1]			0.000003					0.000021	0.000031	0.000706	0.001033
CD-109											
SB-125		0.221478				0.021822		0.000010	0.272325	0.591504	0.000001
I-129[2]								0.000178	0.000337	0.000151	0.008629
CS-134	0.000591	0.017981	0.515854		0.002258	0.047366	0.000012	0.030555	1.021695	85.830821	1.011881
CS-137	0.000662	0.179409	17.607813	0.001386	0.009986	0.337629	0.000063	0.112861	3.098998	212.680584	3.046998
RA-226						0.000001					
TH-228						<0.000001					
TH-232											
U-234											
U-235											
U-238									0.000002		0.000021
NP-237						0.000241		0.000008	0.001147	0.008121	0.000394
PU-238		0.000728	0.005396			0.000394		0.000001	0.000362	0.001528	0.000072
PU-239	<0.000001	0.000427	0.002823					0.000001	0.000107	0.001460	0.000072
PU-240						0.021575		0.000253	0.053173	0.266571	0.012885
PU-241		0.050454	0.205654					<0.000001	0.000003	0.000050	0.000017
PU-242		0.000003						0.000008	0.000730	0.003472	0.000393
AM-241		0.000582	0.011383			0.000809		0.000001	0.001767	0.002470	0.000078
CM-242		0.000072	0.000232			0.000004		0.000003	0.000152	0.001097	0.000124
CM-243								0.000003	0.000988	0.001427	0.000124
CM-244	<0.000001	0.001228	0.010506			0.000377					

[1,2] The concentrations of Tc-99 and I-129 listed in the Table as attributable to nuclear power plants are derived from the amounts reported by the nuclear power plant operators. As part of the process of preparing LLRW projections, the CHWMS has had Vance & Associates, Inc. analyze I-129 and Tc-99 quantities through the use of a computer model. For the purpose of projections, this analysis should more accurately determine the quantities of these two radionuclides produced by the nuclear power plants.

TABLE AP-20B: RADIONUCLIDE CONCENTRATIONS IN WASTE STREAMS SHIPPED OFF-SITE FOR MANAGEMENT FROM CONNECTICUT IN 1996 - FUEL FABRICATION

(Millicuries per cubic foot)

RADIONUCLIDE	F-MIXWAST	F-NCTRASH
H-3		
C-14		
NA-22		
CL-36		
FE-55		
CO-60		
NI-59		
NI-63		
SR-90		
NB-94		
TC-99		
CD-109		
SB-125		
I-129		
CS-134		
CS-137		
RA-226		
TH-228		
TH-232		
U-234	<0.000263	0.031121
U-235	<0.000263	0.001461
U-238	<0.000263	0.008627
NP-237		
PU-238		
PU-239		
PU-240		
PU-241		
PU-242		
AM-241		
CM-242		
CM-243		
CM-244		

TABLE AP-20C: RADIONUCLIDE CONCENTRATIONS IN WASTE STREAMS SHIPPED OFF-SITE FOR MANAGEMENT FROM CONNECTICUT IN 1996 - PRIVATE RESEARCH AND INSTITUTIONAL
(Millicuries per cubic foot)

RADIONUCLIDE	I=ABSLIQD	I=AQULIQD	I=BIOWAST	I=COTRASH	I=LIQSCVL	I=MISCSOR	I=MWORLQD	I=NCTRASH	I=NORM	I=RAMISCL
H-3		3.295563	0.634894	0.414264	0.060617		1.149735	0.000609		
C-14		0.340702	0.064079	0.129831	0.045428		7.692941	0.072572		
NA-22				0.000097	0.001011					
CL-36				0.000122	0.000494					
FE-55				0.000004	0.001551					
CO-60				0.000018		0.000650				
NI-59										
NI-63				0.000001						
SR-90						2.960000				
NB-94										
TC-99										
CD-109				0.000057						
SB-125				<0.000001						
I-129										
CS-134				<0.000001						
CS-137				<0.000001		0.019240				
RA-226									0.172727	0.025532
TH-228										
TH-232	0.005423									
U-234										
U-235				<0.000001						
U-238	0.003615			0.000036				0.000538		
NP-237										
PU-238										
PU-239										
PU-240										
PU-241										
PU-242										
AM-241										
CM-242										
CM-243										
CM-244										

(860) 244-2007
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TRANSMITTAL OF 1996 LLRW MANAGEMENT REPORT

January 16, 1998

The Connecticut Hazardous Waste Management Service (CHWMS) has completed a report entitled "Low-Level Radioactive Waste Management in Connecticut - 1996" (LLRW Management Report).

Enclosed is a copy of the LLRW Management Report. You may request additional copies by calling the CHWMS in Hartford at (860) 244-2007 or 1-800-246-LLRW (toll-free in Connecticut); by e-mailing CTLLRW@aol.com; or by writing to LLRW Management Report, Connecticut Hazardous Waste Management Service, 50 Columbus Boulevard, 4th Floor, Hartford, CT 06106.

This is the tenth in a series of annual reports designed to keep the people of Connecticut informed about low-level radioactive waste (LLRW) management by the state's generators. It provides a wealth of information on LLRW shipped off-site by Connecticut generators during 1996. Information is also given regarding on-site storage of LLRW during 1996.

Included in the report are names and locations of the state's active and potential generators, waste volumes and radioactivities for 1996, waste types, radionuclide compositions, results of waste processing, and pathways to processing and ultimate disposal. The LLRW Management Report also gives historical data on Connecticut's LLRW disposal volumes and radioactivities.

In 1996, thirty four LLRW generators in Connecticut shipped a total of 11,770 cubic feet of LLRW containing 3,088 Curies to disposal facilities.

Connecticut Hazardous Waste Management Service
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TABLE AP-20D: RADIONUCLIDE CONCENTRATIONS IN WASTE STREAMS SHIPPED OFF-SITE FOR MANAGEMENT FROM CONNECTICUT IN 1996 - INDUSTRIAL AND MILITARY

(Millicuries per cubic foot)

RADIONUCLIDE	M-ARMYWST	M-NAVYDRY	M-NAVYWET	N-LIQSCVL	N-LOWASTE	N=LOTRASH	N-SOAQLQD
H-3	14,570.992366	0.000522	0.059682	0.006667		0.000115	
C-14		0.016770	0.001437	0.003333		0.001723	
NA-22							
CL-36							
FE-55		1.119305	0.095933			0.002805	
CO-60		1.119305	0.095933			0.070468	
NI-59							
NI-63		0.089570	0.007648			0.000169	
SR-90		0.000512				0.000129	
NB-94		0.000196					
TC-99		0.000001	<0.000001				
CD-109							
SB-125						0.004836	
I-129		<0.000001	<0.000001				
CS-134							
CS-137	0.001145	0.000512				0.001076	
RA-226	0.229160						
TH-228							
TH-232	0.001079				0.019656	0.000001	
U-234							
U-235						<0.000001	
U-238					0.000048	<0.000001	0.372500
NP-237							
PU-238							
PU-239							
PU-240							
PU-241							
PU-242							
AM-241						0.000013	
CM-242						0.000013	
CM-243							
CM-244						0.000013	

FIGURE AP-4: DECAY OF 1996 LLRW SHIPPED OFF-SITE FOR MANAGEMENT FROM CONNECTICUT

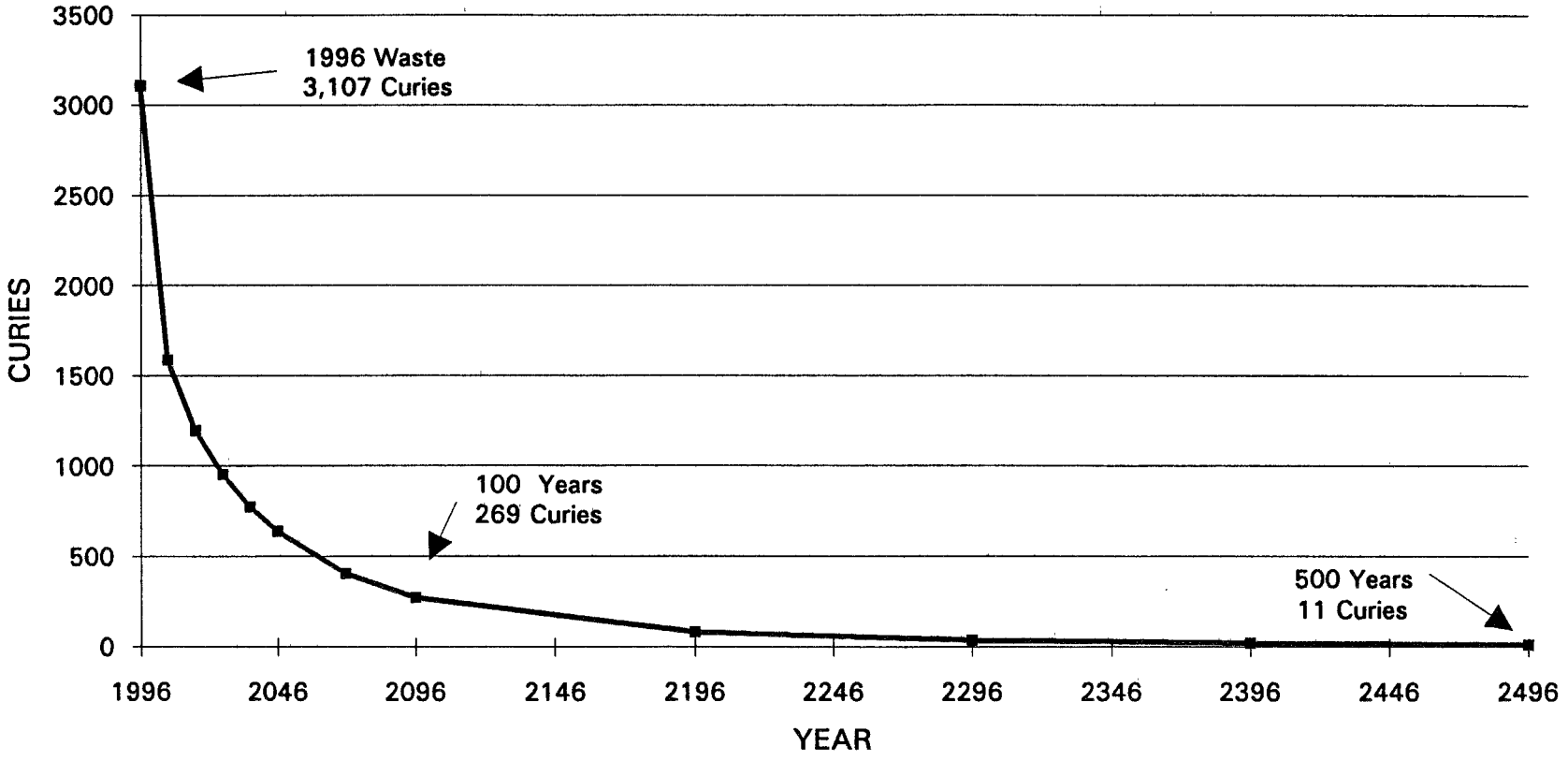

TABLE AP-21: VOLUME AND ACTIVITY OF LLRW SHIPPED TO DISPOSAL FACILITIES BY CONNECTICUT GENERATORS - 1979 TO 1996

YEAR	TOTALS		NUCLEAR POWER PLANTS		OTHER GENERATORS	
	VOLUME (cu ft)	ACTIVITY (Curies)	VOLUME (cu ft)	ACTIVITY (Curies)	VOLUME (cu ft)	ACTIVITY (Curies)
1979	140,200	2,764	128,264	NA	11,936	NA
1980	111,722 *	3,056	126,216 *	NA	14,868 *	NA
1981	112,549	2,813	85,286	NA	27,263	NA
1982	64,697	6,843	45,733	NA	18,964	NA
1983	66,745 *	2,469	49,088 *	NA	16,280 *	NA
1984	57,599 *	186,298	50,430 *	NA	6,604 *	NA
1985	62,613	100,038	48,629	NA	13,985	NA
1986	55,700	7,773	43,175	NA	12,524	NA
1987	45,914	23,886	30,719	23,873	15,195	13
1988	39,741	96,450	25,834	96,440	13,907	10
1989	49,092	21,884	36,676	21,863	12,416	21
1990	34,233	255,160	24,580	255,138	9,653	22
1991	48,871	3,586	26,040	3,562	22,831	24
1992	75,581	29,357	42,973	29,342	32,608	15
1993	15,011	5,372	11,403	5,361	3,608	11
1994	19,338	888	9,322	741	10,016	147
1995	9,714	840	5,277	838.3	4,437	1.4
1996	11,770	3,088	9,290	2,891	2,480	197

NA - Reliable data not available to break total activity into generator components.

*Apparent discrepancy in sum of generator component volumes results from the use of different sources of data for nuclear power plants and for other categories of generators.

SOURCE: State-by-State Assessment of LLRW Shipped to Commercial Disposal Sites, DOE National LLRW Program; Connecticut LLRW Generator Reports for 1987 - 1996, inclusive.

FIGURE AP-5: VOLUME OF CONNECTICUT LLRW SHIPPED DISPOSAL FACILITIES - 1979 THROUGH 1996

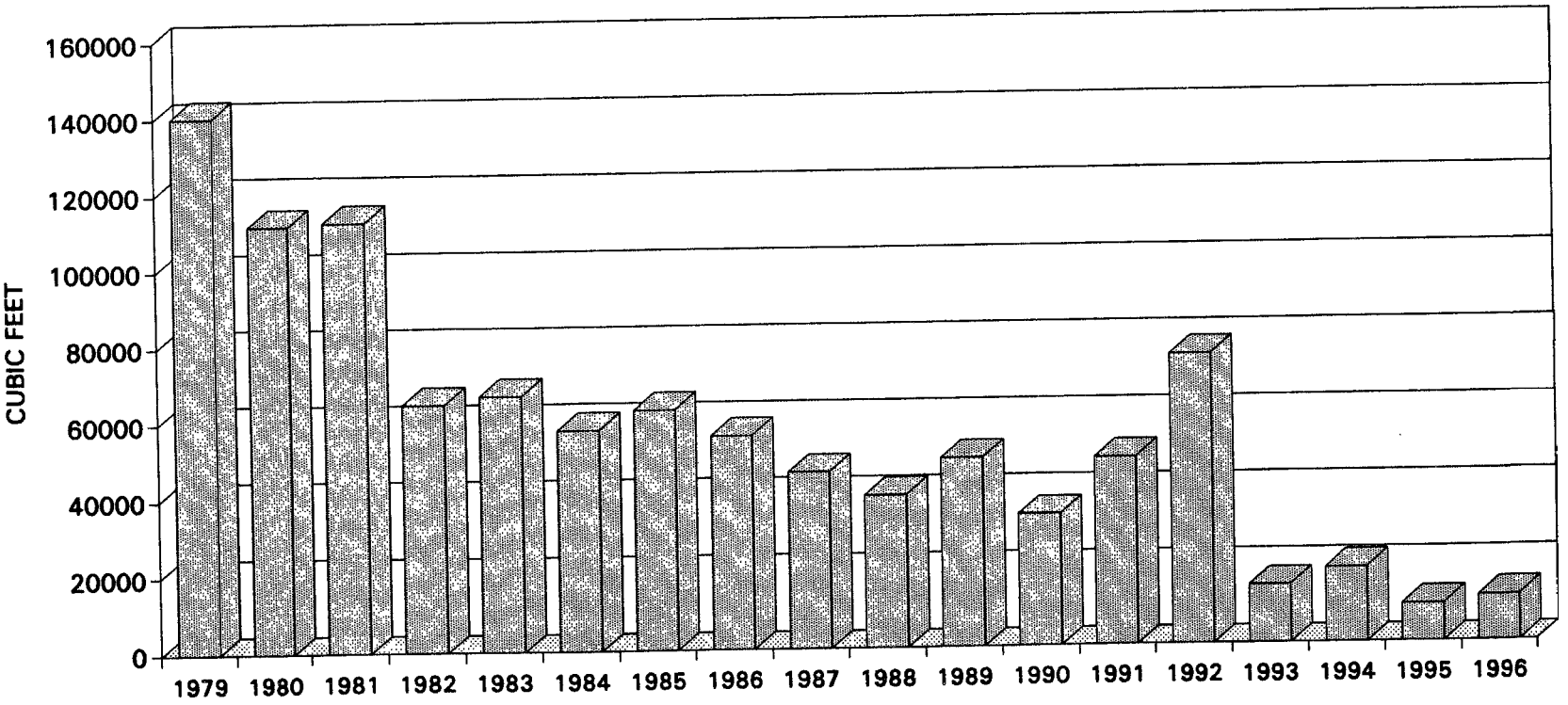

FIGURE AP-6: RADIOACTIVITY OF CONNECTICUT LLRW SHIPPED TO DISPOSAL FACILITIES - 1979 THROUGH 1996

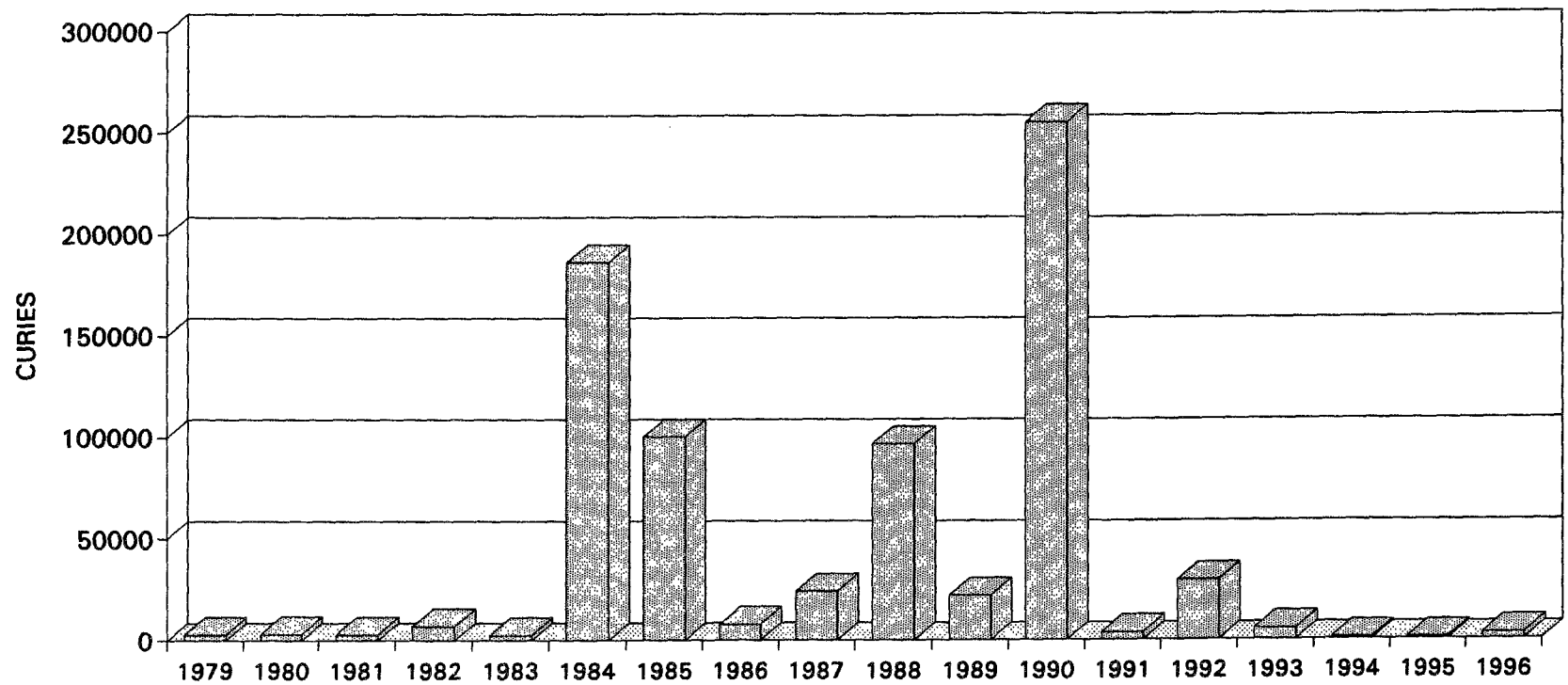

TABLE AP-22: RADIONUCLIDE COMPOSITION OF LIQUID SCINTILLATION VIAL (LSV) WASTE SHIPPED OFF-SITE FOR MANAGEMENT FROM CONNECTICUT, 1987 TO 1996

		RADIOACTIVITY (CURIES)											
RADIONUCLIDE		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
H-3	Tritium	0.097	0.145	0.202	0.117	0.085	0.082	0.064	0.068	0.056	0.071		
C-14	Carbon	0.010	0.020	0.019	0.052	0.031	0.049	0.042	0.034	0.027	0.053		
NA-22	Sodium	0.001	0.005	0.001	0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.001		
P-32	Phosphorus	0.052	0.060	0.042	0.015	0.036	0.019	0.054	0.007	0.004	0.012		
P-33	Phosphorus						0.011	0.001	0.012	0.004	0.026		
S-35	Sulfur	0.023	0.052	0.017	0.017	0.055	0.018	0.050	0.025	0.015	0.076		
CL-36	Chlorine	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.004	0.001		
CA-45	Calcium	0.004	0.012	0.003	0.002	0.001	0.002	1.183	0.009	0.002	0.017		
SC-46	Scandium				<0.001								
CR-51	Chromium	0.001	0.004	0.003	0.003	0.003	0.002	<0.001	0.005	<0.001	<0.001		
FE-55	Iron										0.002		
FE-59	Iron		<0.001					<0.001	<0.001		<0.001		
CO-57	Cobalt						<0.001			0.002			
ZN-65	Zinc		<0.001				0.005	0.005	0.002	<0.001			
RB-86	Rubidium	0.001	<0.001	<0.001	<0.001	<0.001							
SR-85	Strontium				<0.001								
SR-90	Strontium						<0.001						
NB-95	Niobium						<0.001						
RU-103	Ruthenium						<0.001						
CD-104	Cadmium						<0.001						
SN-113	Tin						<0.001						
I-123	Iodine				0.009	0.023	0.002	0.001	0.002	0.004	0.009		
I-125	Iodine	0.005	0.037	0.006	<0.001								
CS-137	Cesium				<0.001					<0.001			
CE-141	Cerium						<0.001						
TH-232	Thorium									0.004			
U-235	Uranium					0.003							
Not Specified		0.001											
TOTALS		0.199	0.337	0.293	0.216	0.237	0.190	1.401	0.164	0.122	0.268		

TABLE AP-23: 50-YEAR VOLUME AND RADIOACTIVITY PROJECTIONS FOR CONNECTICUT'S LLRW DISPOSAL FACILITY

	NO LICENSE EXTENSION*		20-YEAR LICENSE EXTENSION*	
	Volume (Cubic Feet)	Activity (Curies)	Volume (Cubic Feet)	Activity (Curies)
CLASS A				
Non-Utility Operations	290,000	1,000	290,000	1,000
Utility Operations	170,000	28,000	340,000	58,000
Utility Decommissioning	790,000	3,000	790,000	3,000
Total	1,250,000	32,000	1,420,000	62,000
CLASS B				
Utility Operations	28,000	21,000	56,000	40,000
Utility Decommissioning	130,000	1,000	130,000	1,000
Total	158,000	22,000	186,000	41,000
CLASS C				
Utility Operations	16,000	530,000	34,000	900,000
Utility Decommissioning	39,000	230,000	39,000	230,000
Total	55,000	760,000	73,000	1,130,000
TOTAL	1,463,000	814,000	1,679,000	1,233,000
NON-UTILITY				
Total	290,000	1,000	290,000	1,000
UTILITY				
Operations	214,000	579,000	430,000	998,000
Decommissioning	959,000	234,000	959,000	234,000
Total	1,173,000	813,000	1,389,000	1,232,000
TOTAL	1,463,000	814		

* Refers to potential extension of operating licenses for nuclear power plants.

APPENDIX B:

ANNUAL LOW-LEVEL RADIOACTIVE WASTE REPORT FORM FOR 1996

State of Connecticut
Department of Environmental Protection
Monitoring and Radiation Division

- **Enter N/A for any blocks which do not apply.**

1. Company/Facility Name:	Facility Number:
2. Company/Facility Address:	3. Date This Form Was Completed
	4. Prepared by: Name/Title
	Signature:
Physical Location (if different from above):	Phone: ( ) -
5. Radiation Safety Officer: Name/Title/Phone	

Decay in Storage Data

6. List Isotopes Decayed in Storage
7. LLRW Decayed & Released in 1996 Cubic Feet: Millicuries:

On-Site Storage Pending Off-Site Processing and/or Disposal as LLRW

- **Exclude** Decay in Storage.
- **Exclude** LLRW not yet in possession of radiological safety staff.
- Report Only LLRW for which all **on-site** processing is complete.

	Actual Volume & Activity Stored		Estimated Final Disposal Volume & Activity	
	Cubic Feet	Millicuries	Cubic Feet	Millicuries
8. Pre-1996 LLRW in Storage on December 31, 1996				
9. 1996 LLRW in Storage on December 31, 1996				
10. Total LLRW Stored 12/31/96 (Sum of lines 8 & 9)				

LLRW Shipped Off-Site for Management

- **Exclude** material held for decay or discharged to sanitary drain; medical doses you return to a supplier; fresh reagents; raw material inventory; radiation sources and thoriated metals returned to the vendor for recycling; and liquid scintillation vial liquids, except those regulated by the NRC.
- **Include** mixed waste if shipped off-site for management.
- Volumes and activities shipped by generators are "out-the-gate" quantities.
- See "Reference Tables" on Page 5 for waste steams, processing methods, and facility codes.
- Copy form and attach additional pages if you shipped more than 3 waste streams.

Waste Stream Number	Waste Stream 1	Waste Stream 2	Waste Stream 3	Totals	
1. Waste Stream Type (See Table 1)				Volume in Cubic Feet	Activity in Millicuries
2. NRC Waste Class (A, B, C)					
3. On-Site Processing Method (See Table 2)					
4. Volume Shipped Off-Site for Management					

Generator Shipped Waste Directly to Disposal

5. LLRW Shipped Cubic Feet/Millicuries								
6. ID of Disposal Facility (BARN, RICH, CLIV)								

BARN=Barnwell, SC RICH=Richland, WA CLIV=Envirocare at Clive, UT

Generator Shipped Waste to Intermediate Facilities (Processor, Broker, Temporary Storage, Etc.)

7. LLRW Shipped Cubic Feet/Millicuries								
8. ID's of All Processors or Other Facilities*								
9. All Processing Methods (See Table 2)								

*See Table 3

Sum of Intermediate Facilities' Shipments to Disposal (Obtain data from brokers, processors, etc.)

10. LLRW Disposed Cubic Feet/Millicuries								
11. ID of Disposal Facility (BARN, RICH, CLIV)								

Total LLRW Disposed at Licensed Facilities (Sum of Lines 5 and 10)

12. LLRW Disposed Cubic Feet/Millicuries								
13. Final Waste Forms to Disposal								

Radionuclides in LLRW Shipped Off-Site for Management

- Aggregate isotopic composition of radioactivity on **Page 2, Lines 5 and 7**.
- Identify radionuclides by atomic symbol and atomic weight, e.g., Co-60 for cobalt 60.
- Copy form and attach additional pages if you shipped more than 3 waste streams or had additional radionuclides.

	Radioactivity in Millicuries (mCi)			
Radionuclides	Waste Stream 1	Waste Stream 2	Waste Stream 3	Total
Grand Totals				

Mixed Waste

1. Mixed Waste Generated During 1996			
Type of Mixed Waste	Cubic Feet	Millicuries	Description of Waste

2. Total Inventory of Mixed Waste Stored at Your Facility at End of 1996			
Type of Mixed Waste	Cubic Feet	Millicuries	Description of Waste

LLRW Projections

- To be completed by all facilities.

Generation of LLRW for Disposal at Licensed Facilities						
	NRC Class A		NRC Class B		NRC Class C	
Year	Cubic Feet	Millicuries	Cubic Feet	Millicuries	Cubic Feet	Millicuries
1997						
1998						
1999						
2000						
2001						

Annual Assessment Information

- If an annual assessment in accordance with Connecticut General Statutes 22a-165c is required, the following information will be used to determine your facility's proportionate share.
- Lines A, B, and C below should **NOT** include LLRW subject to assessment in prior years.

As of December 31, 1996	Volume (Cubic Feet)	Activity (Millicuries)
A. Total LLRW shipped for disposal (i.e., disposed) at licensed facilities during 1996		
B. Total LLRW in storage which was packaged for disposal in 1996 (No further processing needed)		
C. Estimated volume and activity of LLRW in storage that was not packaged for disposal within one year of generation		
Total Assessable LLRW (Lines A + B + C)		

Reference Tables

Table 1 - Waste Streams (Use O-OTHER and describe waste stream if not listed below.)		Table 2 - Processing Methods	Table 3 - Intermediate Facilities
Nuclear Power Plants	Industrial Facilities	Volume Reduction -Solids	
P-IXRESIN = PWR Ion Exchange Resin	N=LOTRASH = Low Activity Trash	A1 = Compaction	Brokers
P-FCARTRG = PWR Cartridge Filters	N-LOWASTE = Low Activity Waste	A2 = Supercompaction	CLEH - Clean Harbors
P-FSLUDGE = PWR Filter Sludges	N-MISCSOR = Misc. Sealed Sources & Devices	A3 = Incineration	NDL - NDL Organization
P-COTRASH = PWR Combust./Compact. Trash	N-LIQSCVL = Liquid Scintillation Vial Waste	A4 = Shredding	RADI - Radiac Research
P-NCTRASH = PWR Noncomb./Noncompact. Trash	N-SOAQLQD = Solidified Aqueous Liquids	A5 = Placement Packaging	TELE -Teledyne Isotopes
B-IXRESIN = BWR Ion Exchange Resin	N-NARM = Naturally Occurring and Accelerator Produced Radioactive Material	A6 = Metal Melt	USEC - U.S. Ecology
B-FCARTRG = BWR Cartridge Filters		A7 = Other (specify method)	Other - please specify
B-FSLUDGE = BWR Filter Sludges	N-MIXWAST = Miscellaneous Mixed Wastes		
B-COTRASH = BWR Combust./Compact. Trash		Solidification or Encasement	Processors
B-NCTRASH = BWR Noncomb./Noncompact. Trash	Institutional & Private Research Facilities	B1 = Asphalt or Bitumen	ALLI - Allied Tech
L-NFRCOMP = Nonfuel Reactor Core Components	I=COTRASH = Combustible/Compactible Trash	B2 = Delaware Custom Media	AMEC- American Ecology
O-METDCON = Metal Sent for Decontamination	I=ABSLIQD = Absorbed or Solidified Liquids	B3 = Cement	CHEM - Chem-Nuclear
O-MIXWAST = Miscellaneous Mixed Waste	I=LIQSCVL = Liquid Scintillation Vial Wastes	B4 = Other (specify medium)	DSSI- Diversified Sci. Svc
O-MISCLNS = Misc. Non-Hazardous Oil, Sludge, etc.	I=BIOWAST = Biological Waste		ENSC - Ensco Company
	I=NCTRASH = Noncombust./Noncompact. Trash	C1 = Absorption of Liquids	HAKE - F.W. Hake Co.
Military Facilities	I=MISCSOR = Misc. Sealed Sources & Devices		NSSI- NSSI/Recovery Svc
M-NAVYDRY = Navy Dry Waste	I=MWORLQD = Misc. Mixed Waste Organic Liquids	Volume Reduction - Liquids	PERM - Perma-Fix
M-NAVYWET = Navy Wet Waste	I=AQULIQD = Miscellaneous Aqueous Liquids	D1 = Evaporation	SEG - Sci. Ecology Grp.
M-MIXWAST = Navy Mixed Waste	I=NARM = Naturally Occurring and Accelerator Produced Radioactive Material	D2 = Dewatering	Other - please specify
		D3 = Other (Specify method)	
Fuel Fabrication Facilities			
F-NCTRASH = Noncombust. /Noncompact. Trash		E1 Decontamination	
F-MIXWAST = Miscellaneous Mixed Waste			

For Assistance with this Report Call:

Fred Scheuritzel or Andrew Zwick, CT DEP, at 860-424-3029

This Report is due on or before April 1, 1997.

Please submit TWO (2) copies to:

Monitoring and Radiation Division
Bureau of Air Management
Department of Environmental Protection
79 Elm Street
Hartford, Connecticut 06106-5127

Certification of Completeness and Accuracy (Pertains to all pages of this Report, including any attachments.)

Print Full Name & Title of Authorized Official	Signature	Date

APPENDIX C:

BOARD OF DIRECTORS,
CONNECTICUT HAZARDOUS WASTE MANAGEMENT SERVICE

BOARD OF DIRECTORS
CONNECTICUT HAZARDOUS WASTE MANAGEMENT SERVICE

R. Christopher Blake, Esq.
Chairman and Executive Officer

Prior to his appointment to the CHWMS in 1996, Mr. Blake was a partner in the law firm of Guion, Stevens & Rybak in Litchfield. Before entering private practice, he managed the Prosecutorial Unit at the Department of Public Utility Control in New Britain. He serves as a lawyer with the U.S. Naval Reserve, Judge Advocate General Corps. Mr. Blake's education includes a Juris Doctor degree from Vermont Law School and a Bachelor of Arts degree in political science from the University of the South. He lives in Litchfield.

Wallace C. Pringle, Ph.D.
Vice-Chairman
Director Representing the Scientific Community

Dr. Pringle is the former chairman of and now a professor in the Chemistry Department at Wesleyan University in Middletown with research interest in molecular spectroscopy and water quality. His education includes a Doctor of Philosophy degree in physical chemistry from the Massachusetts Institute of Technology and a post doctoral fellowship at the National Bureau of Standards. He lives in Haddam.

Richard J. Heller
Secretary
Director Representing the Business Community

Mr. Heller is Sales Engineer for Aqualogic Inc., a North Haven manufacturer of equipment for wastewater treatment, recovery, and recycling. Mr. Heller is responsible for handling sales and accounts throughout the country. He formerly served as Technical Director for JacksonLea in Waterbury where his work included directing safety and hazardous waste activities and overseeing effluent treatment and recovery. Mr. Heller's education includes a Master of Science degree in chemical engineering from the University of Connecticut. He lives in Farmington.

Robert H. Lutts
Director Representing the General Public

Mr. Lutts is a part-time executive assistant to the Connecticut Republican Party. His previous career was as a pension account executive and consultant, followed by service

as an executive assistant to the Hartford City Council. His education is in history and economics. He lives in West Hartford.

Barbara H. McWhirter
Director Representing the Business Community

Ms. McWhirter is an attorney at law in private practice, dealing with government regulations, environmental, and corporate matters. Ms. McWhirter's education includes a Juris Doctor degree from the University of Connecticut School of Law and a Bachelor of Science degree in agriculture from the University of Georgia. She lives in Cheshire.

Samuel C. Stowell
Director Representing the General Public

Mr. Stowell retired in 1995 as Vice President of Pitney Bowes Credit Corporation, after 36 years with the Pitney Bowes family of companies. He served for 19 years on the Board of Estimate and Taxation in Greenwich, serving 14 years on its Budget Committee (13 years as Committee Chairman) and six years as the Board Chairman. Mr. Stowell's education includes a Bachelor of Science degree from Yale University and a Master of Business Administration degree from the Harvard Business School. He lives in Riverside.

William C. Summers, M.D., Ph.D.
Director Representing the Scientific Community

Dr. Summers is Head of the Radiobiology Section, Department of Therapeutic Radiology, at Yale University in New Haven where he teaches molecular biology and genetics. He conducts research on viral diseases and the genetics of radiation damage, and chairs Yale's Radiation Safety Committee. He is also a professor and lecturer in Yale's Department of History where he teaches courses in the history of medicine and science. Dr. Summers earned a Doctor of Philosophy degree in molecular biology and a Doctor of Medicine degree from the University of Wisconsin, and he subsequently completed a post doctoral fellowship in biophysics at the Massachusetts Institute of Technology. He lives in New Haven.

Leonard F. D'Amico
Non-voting Director Representing the Office of Policy and Management

Mr. D'Amico is Under-Secretary of the Policy Development and Planning Division of the Connecticut Office of Policy and Management (OPM). He previously served as First Selectman of Beacon Falls for 18 years where he was responsible for the municipal operations of the 5,200-population town. Under his leadership, the town successfully upgraded its wastewater treatment plant, developed and instituted a solid waste and recycling program, and cleaned up toxic-waste sites. Other notable accomplishments

during his tenure included the development of senior-citizens' and recreation centers, the renovation of Town Hall, and the construction of a new police station.

Carmine DiBattista
Non-voting Director Representing the Department of Environmental Protection

Mr. DiBattista is Chief of the Bureau of Air Management in Connecticut's Department of Environmental Protection. He is a graduate of the University of Connecticut where he majored in zoology and chemistry and a graduate of the University of Southern Connecticut where he earned his Master of Science degree in environmental sciences (biology). He has been employed in the environmental field with local and state governments since 1967 in water, waste, and air management. Prior to his current position, he served as the Department's Director of Waste Management Planning and Standards.

Brian F. Toal
Non-voting Director Representing the Department of Public Health

Mr. Toal is an Epidemiologist IV with the Division of Environmental Epidemiology and Occupational Health, Connecticut Department of Public Health. During 1993 and 1994, he served as Acting Director of the Division. His education includes a Master of Science degree in public health from the University of Washington, and a Bachelor of Science degree in biology from the University of Connecticut. Having worked in the area of public health since 1981 with private, municipal, and state entities, Mr. Toal is experienced with issues involving environmental contamination, risk assessment, and occupational health surveillance.

Edgar T. Hurle
Non-voting Director Representing the Department of Transportation

Mr. Hurle is Director of Environmental Planning, Bureau of Policy and Planning, Connecticut Department of Transportation. His education includes a Bachelor of Science degree in natural resource conservation from the University of Connecticut. Having served with the Department of Transportation since 1974, Mr. Hurle is experienced with ecological impact assessment for state transportation projects, and with environmental planning and surveillance to ensure compliance with federal and state law.

APPENDIX D:

GLOSSARY

GLOSSARY

Class A LLRW - LLRW which generally consists of short-lived radionuclides (radioactive half-lives of less than 30 years), but also includes low concentrations of some long-lived radionuclides. Disposal of Class A waste must isolate the waste for at least 100 years.

Class B LLRW - LLRW which includes waste with higher concentrations of short-lived radionuclides than Class A waste and concentrations of long-lived radionuclides similar to Class A waste. Class B waste must be in a structurally stable physical form for disposal or in a structurally stable container that will last for a minimum of 300 years.

Class C LLRW - LLRW which includes waste with the highest concentrations of short-lived and long-lived radionuclides that states are responsible for managing. Disposal units for Class C LLRW must have barriers capable of preventing people in the future from accidentally encountering the waste for at least 500 years. The federal government, not the states, is responsible for managing waste that is classified as **Greater than Class C LLRW**.

Compact - (1) (noun) A voluntary, Congressionally-approved agreement between states; also, a grouping of states pursuant to the agreement. For the management of LLRW, federal law provides for the formation of multi-state compacts having specific powers and responsibilities. Connecticut and New Jersey have entered into and comprise the Northeast Interstate LLRW Compact. (2) (verb) The act of compressing LLRW into smaller volumes prior to disposal.

Curie - A unit of radioactivity equivalent to 37 billion radioactive disintegrations per second. This is approximately the level of radioactivity contained in 1 gram of radium-226.

Half-life - The length of time required for the amount of a particular radionuclide to be reduced, through radioactive decay, to one-half of its initial value.

Hazardous Waste - Waste that is listed as hazardous by the U.S. Environmental Protection Agency in 40 CFR Part 261, Subpart D, or that exhibits any of the hazardous waste characteristics identified by the EPA in 40 CFR Part 261, Subpart C. Hazardous wastes may cause or significantly contribute to mortality or illness, or pose a threat to human health or the environment if improperly managed. (§1004, Resource Conservation and Recovery Act (RCRA))

High-Level Radioactive Waste - As defined in federal law, radioactive waste consisting of the residues from reprocessing of spent nuclear reactor fuel to recover unfissioned uranium and plutonium, as well as the spent nuclear fuel itself.

Isotopes - Atoms of an element (same atomic number) having different atomic weights due to different numbers of neutrons in the atomic nucleus. Isotopes of a particular element differ in their stability and radioactive decay properties.

Low-Level Radioactive Waste (LLRW) - As defined in federal and state law, radioactive waste other than high-level radioactive waste, spent nuclear reactor fuel assemblies, or uranium mining and milling wastes. LLRW includes a wide variety of materials that have a wide range of levels of radioactivity. It includes slightly radioactive items, such as protective clothing, paper towels and laboratory equipment, as well as some very radioactive items, such as materials used to purify reactor coolant in nuclear power plants and used equipment from inside nuclear reactors. LLRW is generated in the operation and maintenance of nuclear power plants, as well as by many public and private institutions (hospitals and universities), private research firms, industrial facilities, and the military.

Millicurie - A unit of radioactivity equivalent to one one-thousandth of a Curie, i.e., 37 million radioactive disintegrations per second.

Mixed Waste - Waste material that meets the definitions of both hazardous waste and radioactive waste, e.g., LLRW that is also hazardous waste.

Naturally-Occurring Radioactive Material (NORM) - Radioactive waste that contains radioactive substances found in nature. NORM includes mining wastes, oil and gas production wastes, water treatment residues, coal ash, and discarded radium sources used in medical procedures.

Progeny Radionuclide - A radioactive substance that comes into being as the result of the radioactive decay of another radioactive substance, i.e., the parent radionuclide.

Radiation - Sub-atomic particles and energy emitted by an atomic nucleus during radioactive decay.

Radioactivity - (1) A property of matter by which unstable atomic nuclei spontaneously disintegrate. Through one, several, or a lengthy series of disintegrations, radioactive substances eventually "decay" to stable, non-radioactive substances. (2) A quantitative expression of the rate of decay of a radioactive substance (also "Activity"). As radioactive decay proceeds over time, radioactivity decreases.

Radionuclide / Radioisotope - Radioactive atoms of an element. Not all isotopes of a given element are radioactive.